The Chemical Age

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Notes and Comments

Trend of Chemical Invention

THE increase in chemical invention which was noted in 1933 was not followed by a further increase in 1934, but activity was maintained. According to the 52nd Report of the Comptroller-General of Patents, considerable advance was shown in sensitising dyes used for photographic purposes, due to a closer understanding of the relationship between absorption spectra and chemical composition of the dyes, with sensitising action over increasingly diverse parts of the spectrum. In the case of cyanine dyes, which sensitise emulsions to red and infra-red rays, this understanding stimulated the production of compounds increasing in complexity as the sensitisation progresses further into the red. The production of uncrushable fabrics by impregnating the fibres with artificial resins was another interesting development. Applications were also received for means for obtaining "heavy water" and for the production of organic compounds containing "heavy hydrogen." A better knowledge of the chemical constitution of sexual and other hormones brought appreciably nearer the synthesis of some of these bodies and the manufacture of derivatives which exhibit similar physiological properties. Activity also persisted in the production of motor spirit and lubricating oils by the hydrogenation (under pressure) of carbonaceous matter, and in the separation (by selective solvents) of hydrocarbon oils into constituents useful for particular purposes. The doping of liquid fuels for Diesel engines, in order to lower the temperature of ignition and increase the rate of combustion, was a matter of importance. The number of applications for patents received by the Patent Office during 1934 was 37,409, as compared with 36,734 during 1933.

The Case of the Stolen Professor

THE Royal Society having spent a deal of its research funds in providing a laboratory at Cambridge wherein Professor Kapitza could play at toy soldiers with the atom, the Soviet Government has seized upon the fortunate circumstance of the professor's visit to Russia to forbid him to return to this country on the plea that he is better employed in his native land. Not unnaturally, the Council of the Royal Society is more than a little upset and has used every endeavour to get a return to the *status quo*. Once Professor Kapitza gets out of Russia—if he does—no doubt he will take good care not to return there. Amid the dignified protests of the Fellows of the Royal Society is heard the voice of Professor H. E. Armstrong—to whom we wish many happy returns of his 87th birthday—declaring that the removal of Professor Kapitza to his own country, so far from being a catastrophe, is quite a good idea; that he is nothing more than a clever mechanic who has discovered some minor modification in connection with the liquefaction of gases; that being a Russian subject the Royal Society had no business to make him a Fellow or a research professor; that the work he was doing here was not very important really; and that it could and should have been done by an Englishman.

We must confess to some sympathy with the view that research professorships of the Royal Society, to say nothing of all ordinary scientific professorships, should be strictly ear-marked for natives of the country in which the professorship is held. Of what use is it to encourage our young men to scorn delights and live laborious days in the service of science—often ridiculously underpaid, if value be measured by knowledge—if we pass them over in favour of the foreigner as soon as a plum is about to fall. Now and again a genius arises, a Newton, a Kelvin, a Faraday, but genius is a law unto itself. So long as we flout our own young and promising scientific men, so long will the foreigner be able to say that the British chemist is of no account and so long will our chemical manufacturers use their wits to get permits to buy chemical plant abroad. Science we are told is international. There is a lot of rubbish talked about internationalism; it is true that science is international, that scientific men the world over read the work of their fellows in other lands and mutually discuss problems to their reciprocal benefit. That is all to the good, but the applications of science are not international; they are strictly commercial and are used to further international competition. Whilst scientific men may with propriety make use of each others' knowledge, it does not do to neglect any opportunity of strengthening our own scientific personnel and the store of experience we are accumulating; the war, at least, should have taught us that.

Encourage the British Worker

THERE was a young German scientist who during his last year at college and in collaboration with his professor hit upon a new way of investigating a problem. It was nothing very brilliant, and to some extent it was theoretical and unproved. The immediate results to be expected if the method proved splendidly successful were nothing spectacular. The young man had no funds; the university had none to give him. He approached business houses and without much diffi-

culty found one that agreed to support him with funds and to finance a trip to England to try his method farther afield; it is doubtful whether the firm would receive the slightest pecuniary reward for its action, but apparently that sort of thing is customary over there. For some months, the young man worked; we have no doubt a thesis was published, but it has not made his name famous. All that resulted was another analytical method called " so-and-so's method." Within two years from the date of the visit to England, the young man was a professor—he had arrived and Germany looks forward to more work from him in the future.

In England, a similar young man worked in a similar—almost identical—branch of industry. He worked at home, at nights, and in a few stolen hours in his firm's laboratory. One day he published his results; at least two other young men have been given Ph.D. degrees for repeating some of these experiments and proving their accuracy. What did a thankful country give him? His firm said: " Wasting our time and chemicals like that! Never heard such cheek and impudence; don't let it occur again." His universities, British universities, refused to appoint him to any sort of post. He is to-day a business man, only indirectly connected with any branch of science. There is a moral in this and perhaps some of our industrial and academic leaders may ponder upon it; before they condemn our support of our own people, let us assure them that the facts of our little story have not been in any way over-stated.

A New Raw Material

A PAPER read in London last week before the Institute of Fuel announced the arrival of another raw material for industry. Admittedly it is somewhat of a luxury product and for that reason bears an appropriately high price, though just what that price is cannot be stated. The new product is " pure coal." In coal, "purity" is often considered solely as a matter of ash; it may be considered also as a matter of certain inorganic constituents of the coal, such as phosphorus. sulphur or chlorine, but whichever component is considered, " pure coal " is still commercially pure. To explain this new development attention will be confined to the slack coal. Slack as mined contains, let us say, 20 per cent. of ash; when washed by ordinary means the ash comes down to 4 or 10 per cent. according to the class of coal; when washed by special means, or when washing a special coal with great care, the ash may be down to 2 or 4 per cent.—that is " clean coal." " Pure coal " contains below 1.0 per cent. and often as low as 0.2 per cent. of ash. The method is, in theory, quite simple. Coal has been divided by Dr. Marie Stopes into four major ingredients: fusain, clarain, vitrain and durain. The durain, a mixture of pitch-like jelly and plant remains is the heaviest and usually the highest in ash; fusain, the woody charcoal-like portion, is high in ash—often higher than durain—but because of its cellular structure floats with the lightest coal. It is necessary to remove the fusain if the product is to be " pure coal "; it is not necessary if the product is to be " clean coal." Of the two portions that remain, vitrain is the " jelly " only and is usually singularly pure, whilst clarain, which contains some plant remains, may or may not be pure enough for the purpose. Having removed the fusain, the vitrain is the lightest portion of the residual coal, so that all that remains is to float off the vitrain and as much of the clarain as may be permissible. This is done in a solution of calcium chloride of the correct specific gravity.

The difficulty of the process comes in the fact that the calcium chloride must be kept to within 0.01 sp. gr. if the process is to be successful. Since all coal contains water this is a matter of some difficulty. It is done by passing the incoming coal through a number of calcium chloride solutions of increasing gravity and, after reaching the correct solution where it is floated, the coal and the reject are separately passed back through all the solutions in the reverse order. It is said that this coal will find applications in the aluminium industry for the production of the very clean coke required for making electrodes; for hydrogenation; and as a fuel for the coaldust internal combustion engine. There may be other uses in the chemical industry where a pure carbonaceous material is needed for some process. " Pure coal " is being produced in Germany in considerable quantities, and the plant described at the meeting in question is now in operation at the Ougree Marihaye colliery in Belgium.

Heavy Oxygen

AFTER " heavy hydrogen " comes " heavy oxygen." It is announced that two members of the staff of Manchester University, Mr. J. B. M. Herbert and Professor Polanyi, have succeeded in isolating heavy oxygen water for the first time in this country, although Professor Hertz in Berlin claims to have been successful in doing this two years ago. The method of isolation is an intricate combination of glass and porous clay tubes and depends on diffusion. It is suggested that this isotope of oxygen will facilitate research in the field of advanced organic chemical reactions, being, in a sense, " labelled " oxygen, so that it may be possible to determine the course of chemical reactions by causing part of the reaction to involve oxygen of atomic weight 18. " Heavy oxygen water " does not appear to be in any sense lethal, and appears to be nothing more at the moment than a scientific curiosity.

For the time being the chemical industry can apparently leave the production of most isotopes to the pure scientists in the hope that one day a use can be discovered for them. When that use is discovered, industry will find a way of manufacture. It is a striking fact that as soon as the pure scientist discovers a need the industrial scientist supplies it—a striking testimony that those who apply science are no wit behind those who are able to work with a lofty disregard of costs, sales, and manufacturing processes. An outstanding example of that is given in Dr. Metzger's recent paper upon the production of the rare gases from the atmosphere; he described how " about 20 years ago inquiry began to be made for some of the rare gases of the atmosphere for use in industry. Those interested in air liquifaction undertook to meet the request, and research and development work was undertaken." This work was successful to a remarkable degree although neon is only present to the extent of 1 lb. in 44 tons of air, helium 1 lb. in 725 tons, krypton 1 lb. in 173 tons, and xenon 1 lb. in 1,208 tons, while the boiling points of some of these gases lie within a few degrees of one another. So far krypton and xenon are not recovered in any quantity, " but," says Dr. Metzger, " if a real demand is made for these extremely rare gases, technical skill will be able to meet it."

The Aid of Science to Industry

THE increasing prosperity of the country has been reflected in the increased demand for industrial investigations at the National Physical Laboratory, Teddington. According to the annual report of the Laboratory for 1934, issued on Monday, a quarto volume of 260 pages, with 59 illustrations (H.M. Stationery Office, 13s. net), this increase has been most marked in the work called for by the ship-building industry, the number of ship designs submitted to model tests being the greatest in the life of the Laboratory.

Since its foundation the Laboratory has been an essential factor in the development of British industry. The high accuracy now attained in mass production in this country is largely founded upon the Laboratory's work on the standardisation and testing of engineers' gauges. The accuracy of measurement of electrical power is ultimately dependent on the electrical standards maintained at Teddington with an accuracy of one or two parts in 100,000. The scientific basis of the light alloys industry—so important in aircraft construction—largely depends on the work of the Metallurgy Department on the alloys of aluminium. The Aerodynamics Department has carried out work which has done much to increase the safety of flight during the past twenty years, and the research work carried out in the ship tanks of the William Froude Laboratory has effected an increase in ship efficiency of some 20 per cent.

Refrigeration by Solid Carbon Dioxide

The Physics Department of the Laboratory has for many years carried out important researches on the physics of refrigeration for the Food Investigation Board, which have done much towards perfecting the refrigerated transport of meat and fruit. An interesting item investigated during 1934 deals with solid carbon dioxide, the refrigerating agent used in the familiar tricycles purveying ice cream in the streets in summer. Solid carbon dioxide is also used industrially for various purposes, such as the freezing of fish. Since this material is further below air temperature than the latter is below the boiling point of water, it is more difficult to prevent heat leakage to the solid carbon dioxide than to prevent the escape of heat from boiling water. Leakage of heat results in loss due to the evaporation of the material, so that the efficiency of the containers is of some importance. The insulating efficiency of a number of materials for lining the containers has been measured, and the interesting result was found that the nature of the insulation is secondary in importance to its weight, the lightest material being the best. Expanded rubber was the best of the materials investigated, while cork and "Balsa" wood were also good.

The old British radium standard, which was prepared by the late Mme. Curie in 1913, has recently been replaced by a new standard consisting of a sample of radium chloride of higher purity. The British radium standard is used for determining by comparison the quantities of radium in the needles and other containers used by hospitals. The measurements are made by comparing the radiation given off by a sample of radium with that given off by the standard or a substandard. Practically all the radium used in hospitals of the country is tested at the Laboratory, and five or six containers (about £400 worth of radium) are dealt with every working day. In all, the value of the radium tested at the Laboratory approaches £1,000,000.

Colour Measurement

A simple colorimeter has been designed with the object of enabling all laboratories interested in colour measurement to adopt the N.P.L. system of colorimetry without the need for the purchase of an expensive instrument. Incidentally, the N.P.L. system has recently received international adoption. The components of the new instrument are cheap and easily obtained, and the instrument can be constructed in any moderately well-equipped laboratory. The performance of the new instrument does not fall below that of the more expensive standard N.P.L. colorimeter. The principle on which the new colorimeter works is as follows: By taking three standard colours and mixing them together in varying proportions, the colorimeter produces colours of every conceivable shade or hue. The eye, helped by a suitable optical system, judges when the colour created by the instrument is identical with the colour to be measured. From the relative amounts of the constituents of the composite matching colour are derived the numbers which specify the colour under measurement in terms of the international system. Full details of the instrument will shortly be published.

Annual Report of the National Physical Laboratory

In the Engineering Department the new N.P.L. combined-stress fatigue-testing machines have been continuously employed on a comprehensive investigation of the strength of metals under combined alternating stresses, the main objects of the work being the determination of the stress criterion which produces failure, and the provision of design data for such important engineering components as engine crankshafts. The fatigue resistance has been determined of three materials, *viz.*, (I) 0.1 per cent. carbon steel, (II) 3½ per cent. nickel-chromium steel, and (III) "Silal" cast iron, representing two ductile steels of different types and a "brittle" material. For each material, the fatigue resistance has been determined under reversed plane bending and reversed torsional stresses, and under five combinations of these types of stressing actions. The results of the tests show that the fatigue limits of cast iron are in close accordance with the criterion of maximum principal stress: the results obtained on the two steels show that the fatigue limits of these ductile metals can be expressed by a simple relation of a general form.

The investigation of the mechanical properties of materials at high temperatures continues to be actively pursued. One portion of the work has been concerned with the determination of the tensile, creep, impact and hardness properties of commercial steels and non-ferrous metals at high temperatures. Alloy cast irons have been examined for creep and growth at 850° C.; a study of the behaviour of a series of magnesium and aluminium alloys over the range 20° C. to 150° C., has been commenced; the investigation of the influence of mechanical working and various heat treatments on the creep and other mechanical properties at high temperatures of single melts of carbon and molybdenum steels has proceeded.

Use of Alloy Steels

Work of a more fundamental nature has included an investigation of the creep and stress redistribution of a lead beam under pure flexural stresses. It has been established that plane sections in the beam remain plane as creep proceeds, and that the stress redistribution may be calculated from knowledge of the creep properties under simple tensile stress. The nature of creep under a system of complex stress has been under investigation for the case of combined tensile and torsional stresses in a thin-walled tube.

Recent developments in the manufacture and use of alloy steels have permitted modern steam power plants to utilise higher working temperatures and pressures, with a consequent gain in efficiency. A consequence of this, however, is that an increasing amount of trouble is being experienced with the flanged joints of steam mains, and the Institution of Mechanical Engineers has appointed a committee to investigate this problem. A programme of work is being carried out at the Laboratory on behalf of this committee, which comprises (I) an experimental investigation into the component parts of a flanged joint—such as the behaviour of the packing material and the creep of the stud bolts and nuts of various materials, and (II) full-scale tests on flanges attached to 10-inch diameter pipes, in which the various deformations of bolts and flange are observed while under full-load conditions. In the latter tests the system contains steam at temperatures and pressures up to 1,000° F. and 1 ton per square inch.

Work on the preparation of iron of very high purity has been continued in the Metallurgical Department, and its physical constants are being determined. Such iron is remarkably soft, having a Brinell hardness of only 50, but it is very susceptible to cold working, so that even a very slight distortion in the process of cutting will raise the hardness to as much as 120. In spite of this, the metal can be

well rolled into rod and foil. The highly purified iron is being used for re-investigating the iron-carbon system. An unexpected difficulty has arisen, however, since although iron is without action on the pure alumina vessels used as containers for the molten alloys in the determination of thermal critical points, etc., reduction occurs in the presence of carbon, and some aluminium passes into the metal. This has been overcome by lining the vessels with thoria. Thoria, however, does not adhere to the glazed alumina thermocouple tubes and, although the amount of aluminium taken up from these tubes is very small, efforts are being made to eliminate this trouble.

An iron-rhodium alloy containing 52 per cent. of rhodium has been prepared from iron and rhodium of high purity. The alloy is strongly magnetic. Thermal, microscopical and X-ray analyses show that the alloy formed on fusion was homogeneous, but that a transformation occurs at some temperature above 600° C. The alloy forges easily at 1,100° C., but is very hard at room temperature, being unmachinable by high-speed tool steel. It is hightly resistant to acids.

Magpesium alloys are being investigated for the Metallurgy Research Board as part of the programme of research on light alloys for the Aeronautical Research Committee. The object is to develop light alloys stronger than those at present available, for use both at ordinary and elevated temperatures. There is a demand among aircraft constructors for improved magnesium alloys. Particular attention is being given to the discovery of metals which are soluble in solid magnesium, and which are more soluble at elevated than at ordinary temperatures, so that the strength of the alloys can be improved by heat-treatment.

An appendix to the report gives a list of 220 papers published from the Laboratory in scientific and technical journals during 1933 and 1934.

The British Science Guild, 1910-1935

Some Outstanding War-Time Activities

DURING the passage of the twenty-five years since the late Viscount Haldane, F.R.S., presided at the fourth annual meeting of the British Science Guild in 1910, educational questions have frequently been considered by committees of the Guild; and one of the latest additions to the Guild's programme is the establishment in the present year of a series of lectures to secondary schools, the first of which was given in March last by Mr. Clifford C. Paterson on "The Electron Liberated: Its Industrial Consequences," before nine hundred pupils drawn from girls' secondary schools in the London area. The object of the lectures is to bring young people from secondary schools into contact with certain aspects of progressive science and its applications, few pupils in such schools realising, as stated in the foreword to the lecture by Mr. Paterson, "the intimate connection between their class-room studies or laboratory experiments and things or processes in everyday use."

During the war, steps were taken by the Guild to remedy the shortage of laboratory glassware in this country (supplies having previously come mainly from abroad), and a guarantee was obtained from a large number of schools and other educational organisations to the effect that if British manufacturers would produce satisfactory laboratory ware in sufficient quantities, a market in this country would be assured by these organisations undertaking to purchase supplies from British manufacturers for a period of three years from the conclusion of the war. The supply of British microscopes was also reviewed about this time by a committee of the Guild, and specifications for various types of microscope were drafted and adopted by certain British manufacturers. In February, 1918, the report of the Dye Industry Committee of the Guild was completed, and forwarded with a covering letter to the Prime Minister, the letter pointing out "the urgent necessity for developing the coal tar dyestuff industry so as to place it on a sound scientific and economic footing."

In 1918 and 1919 the Guild organised, under the patronage of the King, two highly-successful exhibitions of British scientific products, illustrative of the advantages of close co-operation between scientific knowledge and industrial enterprise and illustrative also of the progress of British manufacturers in producing many kinds of machinery and apparatus which before the war had been mainly imported from abroad. In most of the industries represented it was shown that rich resources existed in this country, both in mind and material, and that they awaited only the application of the results of scientific research for their proper development, and patient and persistent efforts to turn these industries into successful commercial undertakings.

In 1924, a Conference on Science and Labour in the Modern State was held by the Guild, the papers read at the conference being issued later in book form. More recently, several annual lectures were established—the Norman Lockyer (held in London), the Alexander Pedler (held in the provinces) and the Research and Development (held in London). The aim of these lectures is to stimulate interest in the development of scientific research, particularly as regards the application of its results in industry, medicine, agriculture and human life generally; the Research and Development Lectures (four of which were held during 1934-5 jointly with the Royal Institution) being designed especially to afford to public men—members of both Houses of Parliament, bankers, industrialists—an opportunity of keeping abreast of the latest applications of scientific research.

The securing of adequate attention to the scientific aspect of matters before Parliament has always been one of the aims of the Guild, and in 1919 the Guild formed its first Parliamentary committee; and later, through this committee, succeeded in obtaining the insertion in the Forestry Act of a provision that one of the Forestry Commissioners should have technical qualifications. In 1933, a new Parliamentary Science Committee was set up with the joint support of the Association of Scientific Workers and other scientific organisations; and this committee is now representative of a number of scientific societies and institutions with a variety of scientific interests.

From its establishment, in 1905, the appointment of *ad hoc* committee has been one of the Guild's methods of dealing with various matters bearing upon science, and many reports have been issued by these committees. Amongst the most recent are the report on the scientific and professional staffs in the public services and industry, and the report on the reform of the British patent system. Following the publication of the latter, the Government set up a committee to investigate this question; and the final proposals of the Government Committee for the reform of the British patent system were, in the main, those of the Guild and were embodied in the Patents and Designs Act, 1932.

Hydrogenation Plant for Australia

A COMMITTEE appointed by the Commonwealth Government to investigate the possibility of establishing a plant in Australia for the hydrogenation of coal has presented its report. No recommendation is made, however, other than that the results of the experimental work now being done in England at Billingham, by Imperial Chemical Industries, Ltd., be awaited before any action is taken in Australia.

German Zinc Oxide Trade

GERMANY HAS BEEN SEVERELY AFFECTED by the marked shifts during the last three years in the world zinc oxide trade, characterised by enlarged production in certain countries, notably England, and resultant increased export competition, as well as developing production on a smaller scale in minor countries formerly dependent upon imports. The effects of the increased competition, coupled with decreased world consumption, are seen in the loss of almost 50 per cent. in German exports of zinc oxide, from a volume peak of 29,768 metric tons in 1931 to only 16,609 tons in 1934, while total value showed a much more pronounced decline—from 9,754,000 to 4,175,000 marks.

Heat Transfer in the Food Industry

Institution of Chemical Engineers and the Food Group hold a Symposium

A SYMPOSIUM on heat transfer in the food industry was held by the Institution of Chemical Engineers and the Food Group of the Society of Chemical Industry in the hall of the Federation of British Industries, Westminster, on April 17.

Dr. H. LEVINSTEIN (President of the Institution, and a Past-President of the Society of Chemical Industry) presided during the afternoon session, when Dr. L. H. Lampitt (chairman of the Food Group, and chief chemist to J. Lyons and Co., Ltd.) dealt with "Heat Exchange and Steam Equipment in the Food Industry."

The problems of heat exchange in the food industry, said Dr. Lampitt, were concerned partly with the preparation of food as such, and partly they were problems common to all industry, *i.e.*, they were concerned with the economic production and use of energy. It was hardly necessary to stress that the importance of the subject for the food industry was steadily growing; there was a general transference of work from the housewife to the factories, with the consequent need for control and, obviously, an understanding of the principles underlying that control, be the heat changes involved concerned with the production of refrigeration for, say, quick freezing, or with the temperatures of the baking oven. Moreover, the range of heating media gradually increased, and each medium brought in its train a whole series of problems.

The Need of Collaboration

In regard to these problems, Dr. Lampitt suggested that the chemist in the food industry and the engineer specialist had for too long remained in their own spheres. Collaboration had been offered and accepted, but with a certain amount of suspicion on both sides. All too often the engineer installed a plant—and he was often the engineer of an outside contractor—and the chemist was left to work out his own salvation when he was called upon to control the food produced, or the process, by the plant so installed. In his own laboratory, Dr. Lampitt had endeavoured to secure the services of certain chemists familiar with the principles underlying all problems connected with the production of cold or heat, and he had been fortunate in having as colleagues on the engineering side men who recognised all the aid which chemistry could give to engineering, men who could appreciate both the theoretical and experimental side and who were not content with the usual rule-of-thumb methods of the so-called practical engineer.

On more than one occasion he had been astonished by the lack of appreciation by specialist engineers of the chemical implications concerned with plant that was being installed, and he had been astounded by the reception they had given to suggestions from people who did know something about the problems with which they were dealing. In one case, a suggestion for a certain process was made by his own laboratory. A large firm, which specialised in drying problems, was consulted, with the object of their providing a plant; but their reply was that the thing could not be done. Meetings were held, and he had discovered, much to his surprise, that they had based their opinion on text-books dealing with heat and physics, combined with certain figures obtained from the records of performance of plants erected by them in many parts of the world, though in no case were those plants dealing with the same raw material as that which his company proposed to use. Eventually, the firm concerned had erected the plant, but he personally had to take full responsibility for its success—and he was pleased to say that it was a success.

Much Still to be Learned

Dr. Lampitt instanced this experience demonstrating that there remained a tremendous lot to be learned, that we had still a long way to go before we achieved true collaboration, that chemists and engineers must come together to solve their problems, and that neither must be too dogmatic about these problems. Our knowledge of the chemistry of food at present could be said to be rudimentary to a large extent. We did not know too much of the changes which occurred during the cooking or processing of food; and he felt certain that as more knowledge became available the engineers would have to re-design in a scientific manner much of the plant used to-day—he did not mean re-design it from the engineering standpoint only, but also from the standpoint of the knowledge which was accruing of the chemical actions taking place during the processing of food. As an example, he mentioned the ordinary travelling baking oven, which was an admirable tool in the hands of the baker, although, from experiments carried out by his company, he could say quite definitely that the temperature control in such ovens was not as good as it should be.

Discussing the various heat media used in modern food-processing factories, Dr. Lampitt said that the most important was steam, produced either at high or low pressures, the steam being used either directly or indirectly as a heating medium, or for the production of power. In connection with the use of steam for power production, he said it was used largely for refrigeration. Whilst small rooms and cabinets might be refrigerated by one or other of the modern systems using gas or electricity as motive power, in large installations steam was still the main agent. The applications of refrigeration in the food factory were multitudinous, not only for preservation but also for speeding up many cooling processes which formed a routine in mass-production factories. The quick-freezing process, which had not produced all the wonderful results that had been hoped from it, and which demanded extremely low temperature, was being applied to fish commercially in this country. Slow freezing was used extensively, and both eggs and fruits were preserved by the application of refrigeration. It was, of course, *the* factor in the production of ice cream, and by the use of solid CO_2 the transport of ice cream in bulk, in semi-bulk and in individual small packets had been simplified considerably.

The Choice of Fuels

During the last few years we had seen the increasing use of gas as a medium both for direct and indirect heating, and by reason of its flexibility in application and control it had advantages over both coal and oil. The use of oil as a heating medium in the food industry was in its infancy, and there were possibly many uses to which it could be put beneficially. The modern trend of engineering was to employ a liquid medium, owing to the greater rate of heat transference between liquid and metal than between gas and metal. The use of steam had disadvantages arising from condensation, which was not adequately controllable. The change from steam to liquid would mean sweeping away in one sweep such problems as the purity of water for boiler feed purposes, the conditioning of water, corrosion of metal, and so on. The final realisation of such a means of heat transport was perhaps somewhat far ahead and, at present, in general, we did our best with steam.

One of the most interesting media, continued Dr. Lampitt, was mercury vapour. This method had been put into commercial use by the Hartford Electric Light Co., of Connecticut, in the United States, some three years ago, and was reported to be a pronounced success. The system was a binary one, employing mercury vapour to produce steam for use in a steam turbine. The low pressure of the mercury vapour permitted the use of higher temperatures (958° F.), thus developing an efficiency greater than with a steam process. An overall thermal efficiency exceeding 33 per cent. was obtained on this plant over a whole year's operation. The process was extremely simple—contrary to the usual notion that high efficiency was attended by an increased complexity of design and operation. An interesting feature was that the mercury, after condensation in the steam turbine, was fed to the boiler by gravity, thus eliminating the need for pumps. A 17-ft. column was all that was necessary to overcome the normal boiler pressure used. A recent article in "Engineering," dealt with the erection of another large plant on this system, to produce 900,000 lb. of steam *and* 55,000 kW of electric power, so that it could be assumed that the process had proved satisfactory.

Spray-drying was a method of drying which had not

received the attention it deserved. The rate of drying and the change from liquid to solid being so extraordinarily fast, chemical changes, such as denaturation—using the term in its broadest sense—had no opportunity to occur. The success of the application of spray-drying to milk was well known; and such difficult bodies as horse serum, blood serum and egg white could be dried satisfactorily by that process. So far as he knew, it was the only process which would deal with these things. The fact, too, that the drying and heating medium could be an inert gas had great potentialities.

Steam Generation

In a paper on "Steam Generation in Factories Connected with the Food Industry," Mr. F. H. Preece, A.M.Inst.C.E., A.M.I.E.E., said in the smaller factories the size of unit may not exceed an evaporation of 5,000 to 6,000 lb. of water per hr., and as the greater portion of the steam is only required for process work, such as boiling, heating, driving auxiliary machinery, etc., it does not warrant an expensive boiler plant and a low pressure steam supply of between 100 and 120 lb. per sq. inch will be sufficient. Seldom in such cases is it necessary to consider installing superheaters to increase the temperature of the steam above saturation temperature unless certain special auxiliary plant, which is some distance from the source of supply, requires dry steam, and then superheating the steam about 25° F. would be sufficient.

Where, of course, the process demands a considerable amount of steam, and electrical power and lighting are also required in the factory, it will be an advantage to generate at a higher pressure of 250 lb. or 300 lb. per sq. in., and superheat the steam to a temperature between 600 and 650° F. The majority of such plants have units evaporating 25,000 to 30,000 lb. per hr., and the steam after being used for generating and light is passed out for the process work. Where possible, as much of this process steam is recovered as condensate to ensure a continual clean feed to the boiler and thereby reducing the possibility of dangerous impurities entering the plant.

There are several types of mechanical stokers on the market, for natural draught and forced draught conditions, both for water-tube boilers and shell-type boilers. Among these may be mentioned the chain grate stoker for water-tube boilers, the Bennis stoker, the Hodgkinson stoker, and the Meldrum stoker; many other types are referred to in the late Mr. Bryan Donkin's book.

Great improvement in the efficiencies can be realised if complete records are kept in the boiler house, and these improvements will show themselves on the cost of output. A bonus system in the boiler house on efficient steam production will repay itself in practice provided that operators are given facilities to be able intelligently to operate the plant under their charge. The most important points on which observation should be made are (1) the condition and quality of the fuel used, (2) the best method of burning the fuel efficiently, and (3) CO_2 and temperature readings of flue gases.

Water Conditioning

Dealing with the subject of "Water Conditioning for Steam Generation," Mr. F. R. Jones, M.Sc., A.I.C., said that preservation of the boiler plant and steam system, purity of steam, and economic generation by efficient heat-exchange and by limitation of idle periods, require control of operating conditions by water treatment. This statement must be taken in its broadest sense as including responsibility for the system and the steam supplied from the point of entry of the make-up water to the point where condensed steam is returned to the pre-heating section. For a discussion of the possible chemical reactions at boiler temperatures it is convenient to classify the several metal surfaces which may be affected by the contacting water as (1) pre-boiler surfaces below steam temperature (feed pumps, feed lines and economisers); (2) boiler plates, tubes and headers in contact with water at steam temperature; (3) boiler plates and fittings above water level, superheaters and connections in contact with steam; and (4) systems of power production, steam heating and process work in contact with condensed steam. Damage to the metal may result from direct action of the water, as by corrosion or embrittlement, or from indirect action as when intermediate scale formation causes overheating of the metal Separation and deposition of solids were considered and only brief reference was made to corrosion and embrittlement, the control of which follows from generally accepted principles.

Ideal conditions are not attainable. Hydroxide is required in the feed, but must not accumulate in the boiler; carbonate is required in the boiler, but carbon dioxide should be absent from the steam; dissolved solids in the boiler must be controlled and at the same time sulphate must exceed hydroxide concentration.

Points from the Discussion

Mr. L. O. NEWTON confirmed Mr. Jones' statement with regard to the presence of organic matter being the primary source of foaming in boiler water, and said that even the small amount mentioned as the limit in the paper was quite sufficient to cause the boiler water to foam. With regard to high-pressure boiler practice, he mentioned final conditioning of the feed water with tri-sodium phosphate.

Mr. H. J. SCOTT agreed with Mr. Preece that far too much importance was attached to the output of material per ton of coal used by those responsible for many small plants; consequently, wastage of steam on the part of the management or the operators frequently resulted in blame being attached to the engineer for producing steam at an uneconomic price. It was a very wise precaution to work out the cost of producing the steam and to charge it to the various departments using it; the consumers would then find that the output per ton of coal was very different from the figure obtained previously. There were plenty of oil-fired installations, with boilers of the shell- or water-tube type, in which the efficiency was in the region of 75 per cent., and on that basis the cost per ton of steam generated dropped to a figure more closely approximating the cost of steam generated by means of coal. He knew of oil fuel installations producing steam at a cost of about 48d. per ton.

Dr. LEVINSTEIN mentioned a circular he had received, relating to a new type of fairly high pressure marine boiler, for which an efficiency of between 92 and 93 per cent. was claimed in practice in a large ship. It was oil fired.

Mr. PREECE said that, with the aid of air heaters and economisers, an efficiency of 90 per cent. could be reached quite well. The figure of 92 per cent. was a little on the high side, but it could be attained, probably with gas or oil firing, and using air heaters and economisers.

Avoidance of Scale

Mr. JONES, replying to Mr. Newton, said that in high-pressure plant the complete absence of scale must be ensured, and, as a rule, that could be done only by the use of phosphate. In this connection he mentioned a substance known as "Calgon," introduced by Hall, and which was supposed to be a hexa-meta phosphate, a complex which, when introduced into water containing calcium, caused the calcium ions to be contained in the acid radicle, so that by no chemical means could one detect calcium in the water. There was no precipitation, in that calcium was in the negative radicle. The value of that was that one could not decompose the calcium radicle at temperatures up to something over boiling point, he believed, so that there would be no precipitation in the feed lines if one added "Calgon" to water containing residual hardness. But when the feed reached the boiler water, the effect of the alkali there, and the pressure, caused the meta-phosphate to be changed to the ortho-phosphate, and the calcium—$Ca_2(PO_4)_2$—to come down. A further advantage was that 1 lb. of "Calgon" would destroy as much alkalinity in being converted to tri-sodium-phosphate as would 1 lb. of concentrated sulphuric acid. So that here was a means of precipitating the calcium in non-scaling form, of keeping the feed lines free from scale and of controlling alkalinity, but he believed the snag was that it cost about 9d. per lb.

Mr. L. O. NEWTON said he was experimenting with sodium hexa-meta-phosphate, and it would do all that Mr. Jones had been told it would do. The price of the material constituted a snag; further, it was necessary to use a very considerable excess over the theoretical quantity.

Dr. LAMPITT emphasised the importance of keeping records of plant operation, and added that a factory which was run with all these disciplinary controls would be more effective than one in which these things were allowed to go by the board. The system of selling steam from the boiler house to the departments using it was a most salutary one. In the same way, his laboratory sold its services to the departments using those services; they all knew exactly what they were paying for the laboratory service and what they were paying for their steam.

The British Association, 1910—1935

Twenty-five Years of Systematic Direction to Scientific Enquiry.

BEFORE attempting to review the progress of the British Association since the Coronation of Their Majesties the King and Queen, it would, perhaps, be of value to recall the object with which the Association was formed, namely, "To give a stronger impulse and more systematic direction to scientific inquiry: to promote the intercourse of those who cultivate science in the different parts of the British Empire with one another and with foreign philosophers: to obtain more general attention for the objects of science, and the removal of any disadvantages of a public kind which impede its progress.

Meetings have been held annually (with the exception of 1917 and 1918) in England, Scotland, Wales, and in Australia, Canada and South Africa. War broke out while the Australian meeting was in progress, but the work of the Association was not immediately seriously affected. In 1917 and 1918 the annual meetings were terminated, but invitations were immediately forthcoming from Bournemouth (1919) and Cardiff (1920) for the resumption of meetings after the war, and in 1921, at Edinburgh, a very large attendance indicated that the Association was at least as strongly established as ever.

The Centenary Meeting

The Centenary Meeting held in London in 1931 was an important milestone in the history of the Association. Under the presidency of General the Rt. Hon. J. C. Smuts, this was a brilliant and successful gathering, with, as General Smuts emphasised in a message to the King, a distinct "imperial character." The King's message to the Association is more than worthy of recall. "A hundred years ago your first meeting was held in York. Ever since that memorable September evening the British Association has steadily advanced, and you can truly say that the roll of its members is bright with names that the world will never forget. Although we live in times fraught with difficulties, scientific progress does not slacken, and I know that the contributions to all branches of science made by your world-renowned members of the past are continued to-day by many distinguished men."

Royal interest in the Association was initiated by the Prince Consort, who, having attended the meetings for several years, did the Association the honour of accepting the presidency, in 1859, at Aberdeen. Last year, when, after an interval of 75 years, another meeting was held in Aberdeen, a message was sent to the King at Balmoral, recalling the Royal Presidency of 1859 when Prince Albert "delivered an address which disclosed his own profound interest in the advancement of science." The message went on to say: "The many marks of Royal favour which have been extended to our Association on subsequent occasions have provided further signal encouragement to us in our pursuit of the aims outlined by His Royal Highness." A gracious reply was received from the King and both messages were read at the Inaugural Meeting. Among "the many marks of Royal favour," two are outstanding, firstly, the presidency of the Prince of Wales, at Oxford, in 1926, and, secondly, the granting by the King of the Charter of Incorporation in 1928.

The Prince of Wales at Oxford

The Oxford Meeting was one of the most brilliant and most widely supported of recent years. The Prince delivered his Presidential Address on "The Relations between Science and the State," in which he outlined a number of research problems undertaken by the state since the war. The Sheldonian Theatre, in which the address was delivered, held not much more than a third of those who had hoped for admission, and it was found necessary to provide two other halls for overflow meetings, to which the address was relaid.

The Royal Charter of Incorporation granted by the King in Council on March 22, 1928, is now one of the most cherished possessions of the Association. In the Charter, the following clause is of interest: "Inasmuch as We have heretofore been Patron of the existing Association, We do hereby reserve to Ourselves to be the first Patron of the Association after the granting of this, Our Charter." By virtue of the Charter the Association was enabled to exercise its full potentialities: securities formerly in the hands of trustees were transferred to the Association itself, and it now became possible to administer directly the property of Down House, in Kent. Down House, the home of Charles Danvin from 1842 to 1882, was presented by Sir Brickston Browne to be held in trust for the nation, and is now preserved as a memorial open to the public.

The progress of the Association has been marked by several changes. The place of women in the Association is of interest. In the early years of the Association the attendance of women at its meetings was regarded with disfavour, but gradually they acquired equal rights with the other sex and, finally, became eligible to hold office in the various sections. It fell to Miss Ethel Sargant, in 1913, to have the honour of being the first woman elected as a Sectional President.

Again, the terms of membership have been altered within this period. In 1919, the Council and General Committee abolished the entrance fee of £1 charged, in addition to membership fee, to those who were not Associates. Access to membership has been made easy both financially and as regards "technical qualifications," which latter are not demanded.

An important innovation in 1920-21 was the arrangement whereby the Association was enabled to offer annually a limited number of "exhibitions" to science students nominated by their colleges. Subsequently, universities and colleges have been encouraged to award similar exhibitions of their own. Further, the membership fee for students was reduced to half the ordinary, so that annually a large number of young scientific workers have the opportunity of making social contact with all the well-known leaders of science.

An Improvement in the Programme

An improvement in the programme was made in 1921 when the council, with the agreement of organising sectional committees, gave power to the general officers to arrange the hours of presidential addresses and discussions, thus introducing a co-ordination which was not previously achieved by a dozen organising committees working separately. About the same time, too, a volume, "The Advancement of Science," an annual collection of the presidential addresses, was first published and has met with much success. Each year some 200 papers are communicated before the annual meeting and "The Advancement of Science" brings to a wider public than that attending the meetings, something of that wide range of scientific literature all of which it is impossible to print in full.

Having as one of its specific objects "the removal of any disadvantages of a public kind which impede the progress of science," the British Association has from time to time approached the Government with specific proposals and requests, many of which have been received with favour. After the war, one of the first duties of the Association was to represent to the Government the pressing need of organising scientific research. The successful establishment of D.S.I.R., with its advisory council, research boards and industrial research associations, has helped considerably to improve the connections between science and the State.

From year to year there are about 50-60 research committees doing voluntary work in the name of the Association, assisted in some instances by small grants from funds insufficient to meet the full demands made upon it. One recent example of this work may be cited. In 1932, it was apparent that there existed no adequate survey of water reserves in the country. A committee was appointed, enlisted the services of the Institute of Civil Engineers, and representations were made to the Minister of Health, who set up a Government Committee.

In this type of work, as indeed in all departments of the Association, men of science give freely of their best with no thought of reward save that of the satisfaction which is brought by achievement, and, in this year of Jubilee, the British Association goes on to Norwich, satisfied with the past and with great hopes for the future.

The British Industries Fair 1935

Exhibits at Castle Bromwich, May 20—31

THE engineering and hardware section of the British Industries Fair opens at Castle Bromwich, Birmingham, on Monday next, May 20, and will be in progress until May 31. The Prince of Wales will visit Birmingham on May 23 for the purpose of making a tour of the exhibition. In previous years the London and Birmingham sections of the Fair have been held simultaneously in February, but the Birmingham Chamber of Commerce, which is responsible for the organisation of the engineering section, decided that it would be more convenient for overseas buyers if the Fair were held later in the spring. A comprehensive trade catalogue of the Fair was issued on Tuesday, giving details of the goods shown by about 1,030 exhibitors, which is only twelve fewer than the record number in the history of the Birmingham section. Sixteen of the exhibitors have shown every year since the section was first held in 1920. In that year the exhibits at Birmingham occupied 85,000 sq. ft. This year the inside area alone covered by exhibits is 274,000 sq. ft. and there is, in addition, a large area of outdoor exhibits.

The exhibits are arranged in four groups: (a) Hardware, ironmongery, brass-foundry, farm and garden equipment; (b) building, decorators' materials, general heating and cooking; (c) electricity, generation and transmission, industrial and domestic appliances for heating, cooking, lighting and power; and (d) light and heavy machinery, power generation (prime movers), plants for industrial purposes, metals, tubes and sections, road and contractors' plant and materials; and transport. The catalogue provides a comprehensive guide to the exhibits, and has been so arranged that ready reference can be made to any one of the thousands of articles displayed, or, alternatively, to any individual firm. The index of exhibits deals with considerably more than 2,500 categories into which these fall. Then follows a classified list of the exhibitors under the numerous headings, succeeded again by an alphabetical list of individual firms, together with a summary of the products for which they are responsible.

Catalogues for Foreign Buyers

Buyers are expected from all parts of the world. For the convenience of these visitors the catalogue is available with insets of the exhibits translated into nine languages. It is anticipated that there will be more Dutchmen among the visitors than any other nationals, with Frenchmen, Germans, Belgians, Danes, Poles, Italians, Norwegians, Swiss and Spaniards next in that order. From within the Empire there will be most buyers from the Irish Free State, with India, South Africa, Australia, Canada and New Zealand next.

The following notes are based on information supplied to us by exhibitors of plant and equipment of interest to the chemical and allied trades.

Aeraspray Mfg. Co., Ltd., are exhibiting a spraying plant with pre-selective fan control. The point when the fan is brought into operation may be instantaneously on the first movement of the trigger or beyond the operation of the trigger when a conical spray only is desired. (Stand D632.)

Atlas Preservative Co., Ltd. (Stand D325/222), are demonstrating the elasticity and durability of "Atlas Ruskilla" iron and steel paint. This paint grips the metal tenaciously, forming a tough covering, and stubbornly resists the attacks of acid and alkaline fumes, steam, moisture and exposure to weather.

Exhibits of Fusion Welding

Fusion welding is being thoroughly represented by Babcock and Wilcox, Ltd. (Stand D501/400), by means of X-ray films and test specimens. The B. and W. gravity bucket conveyor is shown by means of a full-size working exhibit. A full-size small economiser of B. and W. flash-welded construction is also shown as well as tube cleaners of all types, including a new development of electrical tube cleaners.

The Birmingham Battery and Metal Co. (Stand D707/608) are showing coils of brass and copper strip, film strip for radiators, condenser tubes in brass, cupro-nickel, aluminium-brass (B.N.F. Pat. No. 308,647) and non-ferrous sheet of all descriptions.

The Calorising Corporation of Great Britain, Ltd., make a display of Calmet, a chromium-nickel-aluminium alloy steel available in cast form, specially developed for parts required to sustain a load at high temperatures. This alloy possesses extreme stiffness at all temperatures up to a safe working limit of 1,050° C., and is entirely resistant to corrosion in contact with ordinary products of combustion. (Stand D501/400.)

Cellactite asbestos-protected metal roofing and roof ventilators are being shown by Cellactite and British Uralite, Ltd. Cellactite has by many years' use in severest conditions throughout this country and abroad on chemical plants proved every claim made for it. Urastone incorrosible flue pipes and fittings for the venting of chemical fumes, air conditioning are also shown. (Stand B614.)

Chance Brothers and Co., Ltd., are showing a full range of laboratory glassware, glass silk, which is very efficient for heat and sound insulation; also Bornkessel burners. (Stand C701/600.)

Distant Indication and Recording

Apparatus exhibited by Evershed and Vignoles, Ltd., includes special demonstration equipment showing the distant indication, recording and integration of flow of gas through pipes. The equipment exhibited is similar to that supplied to Stewarts and Lloyds' new steel works at Corby, Northamptonshire. The equipment consists of a ring gauge originating movement made by George Kent, Ltd., measuring the difference of pressure across an orifice plate fixed in the gas main. Equipment specially designed for water level indication, the indicator being of the circular type with a scale 36 in. long, is also exhibited. (Stand C325.)

A new design in prefiller presses, the downstroke and the upstroke, is being exhibited by George Finney and Co., the advantages claimed being ease of control, speed of operation and low consumption of pressure water. This combination should appeal to all users of hydraulic presses. (Stand C424.)

The exhibit of the Foster Instrument Co. (Stand C307) consists of a large range of indicating, recording and controlling pyrometers and electrical temperature measuring equipment for industrial purposes. Several new instruments are being shown, including a new continuous chart recorder of the direct deflection type, which provides an open record on a 7-in. chart without the complication of the potentiometric method. There is also a special display of automatic temperature control equipment as used for heat-treatment furnaces. (Stand C307.)

Grant and West, Ltd., are exhibiting metal-to-metal jointing material in powder form, which, in practice, forms a non-oxidising, non-rusting joint, guaranteed to make tight and keep tight joints under the most exacting jointing conditions, such as steam, super-heat, water, gas, alcohol and other chemicals. (Stands C303 and D206.)

Woven-Wire and Perforated Metals

Woven-wire in all meshes, metals and gauges of wire; wedge wire in various metals and apertures showing all types of wedge sections; perforated plates in all metals showing a wide variety of perforations, and also showing plates curved to form screen barrels; wire conveyor belts, I.M.M. screens and wire brushes are exhibited by N. Greening and Sons, Ltd. (Stand C503/402.)

The extensive range of perforated metals shown by G. A. Harvey and Co. (London), Ltd. (Stand B417/316), is of particular interest; innumerable patterns are needed for all kinds of sifting, sorting, filtering and grading purposes. Woven-wire cloth is also produced by this firm.

Higgs Motors, Ltd. (Stand C506), are exhibiting a range of industrial electric motors of standard types, together with fractional horse-power motors, geared motors, stator and rotor units, and various parts and accessories used in manufacturing this equipment.

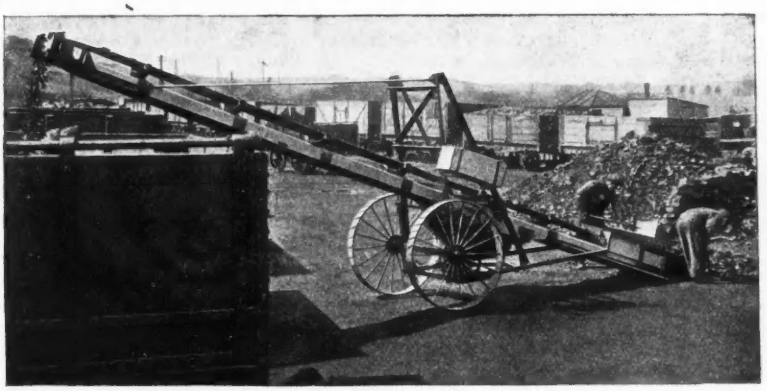
The products exhibited by High Speed Steel Alloys, Ltd. (Stand D621), show a full range of salts and oxides of tungsten, molybdenum and vanadium, as used in the filament and colour and dye trade. Metallic carbides, self-fluxing rosin solder and alloy steels are also shown.

Equipment for Chemical Works

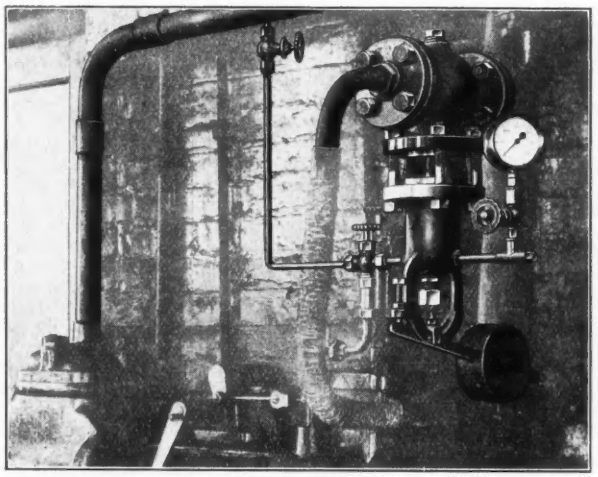
as shown at the

British Industries Fair, Birmingham

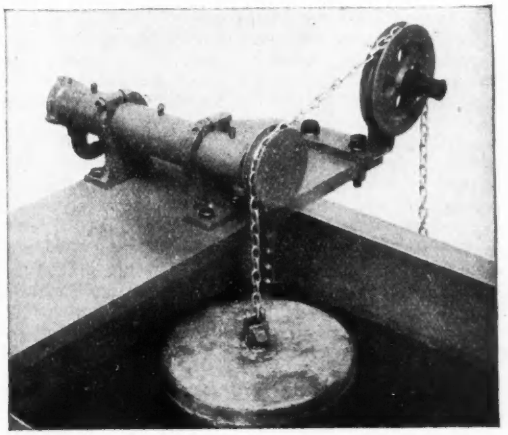
(May 20—31).



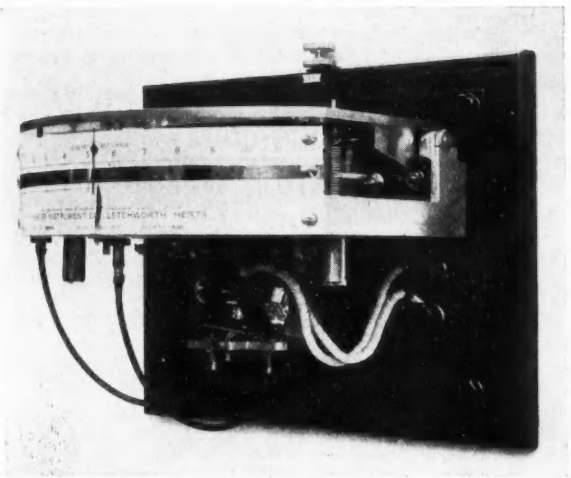
Loading the further side of a wagon by means of a portable belt conveyor, as supplied by Mavor & Coulson, Ltd., Stands C1003/909 (outdoor).



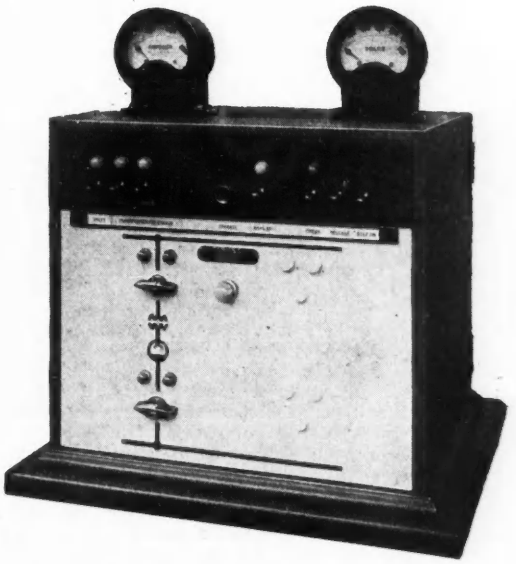
A pump governor, which maintains the desired excess water pressure for boiler feed service, is exhibited by Copes Regulators, Ltd., Stand D.141.



This equipment for indicating water level in tanks, with special indicator (not shown), is exhibited by Evershed and Vignoles, Ltd., Stand C325.



One of the many electrical indicating and recording instruments for temperature measurement, as exhibited by the Foster Instrument Co., Ltd., Stand C307.



Control panel and apparatus cabinet of the supervisory control gear, of which a working model is exhibited by The General Electric Co., Ltd., Stand C627.

New exhibits by Imperial Chemical Industries, Ltd. (Stands D306, D405 and Exhibition Road), since last year's British Industries Fair include "Leukon," the new plastic: "Mouldrite" transparent moulding resin; modifications in the design of degreasing plants and additions to the range of non-ferrous metals.

"Matthelytic" silver for process plant is the principal feature of the exhibit by Johnson Matthey and Co., Ltd. (Stand D711). This metal is guaranteed 99.99 per cent. pure and is gaining popularity in the foodstuffs, essential oils, artificial silk, brewing, photographic and other industries where corrosion is encountered by the organic acids. Silver completely resists corrosion by these acids and by most alkalies, and, owing to its extreme ductility, existing plant and vessels can be lined with it in addition to the manufacture of solid silver plant. Silver wires and gauzes for catalysts in the manufacture of formaldehyde are also shown, together with Staybrite steel wires and gauze, which are used for a variety of purposes in the chemical industries. The platinum laboratory equipment includes crucibles, dishes, gauze, electrodes, and micro apparatus; gauze catalysts for sulphuric acid manufacture are supplied stitched and framed if required.

Motors for Vapour-laden Atmospheres

Electric motors for use in explosive atmospheres or dangerous vapours are being shown by Laurence, Scott and Electromotors, Ltd. These motors are constructed in squirrel cage and slip-ring patterns and are of two main types. The first is from 25 to 30 h.p. Above this natural cooling becomes uneconomic and the range is then continued by a series of "Emcol" totally-enclosed machines, which operate on the principle of the interior air of the machine circulating through the machine and through a series of tubes forming part of the carcase, and between which tubes the cool exterior atmosphere is driven on the contraflow principle. (Stand C521.)

Thomas Locker and Co., Ltd. (Stand C420), have devoted one-half of their stand to wire cloth, perforated metals, wedge sieves, wedge bar screens and general wirework. Wire cloth in various metals and meshes, and sheets in a variety of perforations are on view. The growing use of stainless steel and aluminium has not been lost sight of, and particular attention is paid to exhibits in these metals. The other half of the stand is occupied by a special display of "Locker-Trayco" screens, feeders and conveyors.

McKechnie Brothers, Ltd. (Stand D623), are exhibiting anti-friction metals, zinc base die casting alloys, terne metal, chill cast phosphor bronze and gunmetal bars for bushes and bearings, granulated cupro-nickel, and manganese copper. They are also showing sulphate of copper and lithopone.

Portable Conveyors

Mavor and Coulson, Ltd., of Glasgow, are exhibiting the Joy Loader. The loader moves forward and pushes the head into the heap; the gathering arms, acting alternately, sweep the material on to the conveyor. The front conveyor delivers either to a rear conveyor, slewed hydraulically, or to a chute. (Stand C1003/902.)

Meldrums, Ltd. (Stand D331), are showing one of the smaller sizes of their large range of steel-cased incinerators with a cross-tube water heater incorporated in the chimney. "Meldrum" special acid-resisting metal is represented by a centrifugal pump, with suction and delivery pipes, cocks, tank, etc., in this metal which is resistant throughout to industrial acids. A special metal has recently been brought out for hydrochloric acid; various cocks and valves, pipes, bends, tees, etc., are shown in this metal.

The exhibits on the stand occupied by the Mond Nickel Co., Ltd., comprise a varied selection of applications of nickel steels, light alloys containing nickel, nickel cast iron, nickel iron and nickel non-ferrous alloys. Specimens of the precipitation-hardening copper-nickel alloys are also displayed; these remarkable materials are the result of research to discover suitable non-ferrous alloys which combine the superior corrosion resistance of non-ferrous alloys with the desirable mechanical properties of steels. Nickel-clad steel specimens are displayed in the form of flattened plates and twisted rods to show adhesion of the nickel to the steel. (Stand D408.)

The exhibits shown by David Moseley and Sons, Ltd. (Stand D721), consist of hose, sheeting, tubing, belting, rollers, gloves and mechanical moulded rubber products.

Automatic controllers for steam, gas, oil, water, brine or electricity are being shown by Negretti and Zambra (Stand C205/194), comprising indicating, non-indicating and one- and two-pen recording types. Other instruments displayed include thermo-electric controllers, pressure controllers, humidity controllers and mercury-in-steel thermometers with "microbore" capillary tubing.

Essential features of a new boiler which is being exhibited by Ruston and Hornsby, Ltd. (Stand D324), are a wet-back combustion chamber and two sets of fire tubes. The products of combustion pass through the boiler flue to the combustion chamber, returning to a chamber at the rear of the boiler through another set of tubes. A feature of the design is the provision of a number of tube-cleaning holes in the smoke box, one cleaning hole being provided for every four tubes. Other exhibits on the stand will include a small vertical Thermax boiler, 3 ft. dia. × 7 ft. high, giving an evaporation of 515 lb. per hour.

Representative samples of valves, from ½-in. to 8-in. bore, in cast and malleable iron and gunmetal, are being shown by Saunders Valve Co., Ltd. (Stand D317). There are two distinct patterns of this valve, the "standard," operated by a handwheel, and the "quick-acting," operated by a hand-lever action. Cut-open samples illustrate the operation of each type. Attention is called to the glass-lined and rubber-lined varieties; here the fluid is kept entirely free from contact with any metal surface.

Soap-Making Machinery

Soap-making machinery shown by Henry Simon, Ltd. (Stand D611), includes a three-roller soap milling machine for milling toilet soap, and a soap plodder for the compression of soap ribbons into solid bars. The soap mill is of a new design and is larger than earlier types.

Tangyes, Ltd. (Stand 403/304), are exhibiting a complete range of "A.R." type centrifugal pumps, from 1½ in. to 6 in., and boiler feeding pumps.

The Copes pump governor, which is being shown by Copes Regulators, Ltd. (Stand D141), is an automatically-controlled balanced valve, intended to be fixed in the steam supply main to the feed pump. The governor valve plunger is moved by means of a straight-line action, transmitting the movement of a sylphon bellows due to varying pressure conditions on either side. The principal duty of this governor is to maintain the desired excess water pressure for boiler feed service. It can be used on vertical, simplex or horizontal duplex steam pumps, or steam turbine driven centrifugal pumps. The whole governor has ample strength for 200 lb. steam working pressure.

A varied selection of electrical apparatus is being shown by the General Electric Co., Ltd. (Stand C627). The exhibits include a working model of supervisory control apparatus and its application to typical installations representative respectively of power, lighting and heating equipment. In this system the whole equipment of a number of sub-stations is controlled and supervised over two or four common pilot wires. The equipment can be employed to give indications of the pressure, speed of movement and other characteristics of a gas or liquid, and to enable chemical processes to be co-ordinated at a central control point.

THE CHEMICAL AGE is showing at Stand A623 in company with the other fourteen trade and technical journals published by Benn Brothers, Ltd.

Crude Drugs in Peru

THE use of crude drugs and herbs produced in Peru, especially among the native Indians, who constitute 70 per cent. of the population, is still considerable. The following are the principal herbs produced and used in the manufacture of domestic pharmaceuticals and medicinal preparations: cascarilla, coca, eucalyptus, globulus, Huamanripa, ratania, linaza, yerba, luisa, muna, manzanilla and cube.

German Amber Production

AMBER deposits in Germany are located in the north-western section of Samland, in East Prussia, and cover an area of 500 square kilometres. Mines are owned by the German Government, and the annual production amounts to approximately 500 kg. of amber. Prior to the World War, 75 per cent. of the German production of jewellery amber and 90 per cent. of pressed amber were exported, but exports in recent years have been greatly curtailed.

Society of Glass Technology, 1916—1935

Twenty Years of Useful Service

THE inaugural meeting of the Society of Glass Technology was held at Sheffield in November, 1916, under the chairmanship of the late Mr. Frank Wood, of Barnsley, who had been one of the prime movers in the institution the year before of a Department of Glass Technology in the University of Sheffield. Mr. Wood became the first president, and Dr. (now Professor) W. E. S. Turner was appointed the first hon. secretary and editor of the Society's "Journal." These two may be regarded as the leading founders of the Society and their efforts in establishing the Society on a firm basis were early recognised, for in December, 1919, presentations were made to both. In the case of Mr. Wood, a sum of money was placed at the disposal of the University of Sheffield, the interest on which was to be devoted to providing an annual prize. This prize is awarded in the Department of Glass Technology and is known as the "Wood Medal and Prize in Glass Technology."

Under the progressive guidance of Professor Turner, the Society continues to flourish. In particular, its quarterly "Journal," edited by him, has earned a high reputation among the world's technical periodicals. Evidence of this is afforded by the fact that the Society now has members in over 20 foreign countries. Of nearly 700 members, 260 are resident abroad, including over 100 in the United States, where the Society has an able treasurer, Mr. F. C. Flint.

This contact with foreign countries has been one of the marked features of the Society's activities, for progress in glass technology calls for continuous exchange and interchange of ideas with all other countries engaged in similar efforts. In 1920, a party of members visited America, in 1923 a visit was paid to France, in 1924 to Belgium, in 1928 to Germany and in 1933 to Italy.

The international relationships of the Society of Glass Technology were further cemented in 1930 when important joint meetings were held in London with the German Society of Glass Technology (Deutsche Glastechnische Gesellschaft). The latter society was not founded until 1923, its institution having been stimulated by the success of the English Society of Glass Technology.

One important outcome of the Milan Congress was the formation of an International Commission for Glass Technology, of which Professor W. E. S. Turner was elected president. Professor Turner has been elected an honorary member of both the American Ceramic Society and the Deutsche Glastechnische Gesellschaft. He was president of the Society of Glass Technology, 1922 to 1924.

Although the headquarters of the Society are at Sheffield, alternate meetings are usually held at some centre of the glass industry outside Sheffield. Occasionally, joint meetings have been held with other societies, *e.g.*, the Ceramic Society, the Illuminating Engineering Society and the Physical Society. Several local sections of the Society have been instituted. A London Section was formed in 1929, a Midlands Section in 1933, and a Yorkshire Section in 1934.

The Society has, in addition to these local sections, active committees dealing respectively with (a) glass standards, (b) refractory materials and (c) furnaces. Efforts are being made to institute international standards in glass technology. The 19 volumes of the Society's quarterly "Journal" so far published contain 540 original papers and reports, 12,300 abstracts of papers from other periodicals, and over 200 reviews of books. In 1927, the Society issued an important monograph on "The Constitution of Glass." This was followed, in 1930, by a brochure, "Notes of the Analysis of Glasses, Refractory Materials and Silicate Slags." In 1934, the Society published the third edition of its "Directory for the British Glass Industry," the first edition of which appeared in 1923. Conventions are now well-established institutions, but it was not until 1928 that the glass industry held its first convention at Bournemouth, the Glass Manufacturers' Federation co-operating with the Society in its organisation.

Institution of Petroleum Technologists, 1913—1935

Members Now in Forty-Six Countries

THE Institution of Petroleum Technologists celebrates its twenty-first birthday during 1935. Founded in 1913, chiefly through the endeavours of the late Sir Boverton Redwood, Bart., the inaugural meeting was held in March, 1914. The ever-increasing use of petroleum products in all branches of industry makes it essential that those engaged in the production of these commodities should have some organised means of discussing the many problems which arise in the course of their work. This the Institution has provided by its meetings and by its "Journal."

During 1933 the Institution organised in London a World Petroleum Congress, which was attended by delegates and members from all parts of the world. Over two hundred

The membership of the Institution is now 1,325, and its international character is indicated by the fact that 46 countries are represented on the roll of members. The growth of membership has been a regular one since the inception of the Institution, and a high standard of qualifications and experience has always been required from entrants. There are five classes of membership—honorary members, members, associate members, associates and students. Outside Great Britain the largest groups of members naturally occur in the principal oil-producing centres of the world. Thus, the United States, Persia, Trinidad, Roumania and Burma are each represented by over 50 members. In the case of the four last-mentioned countries there are vigorous branches of the Institution, where problems of local production and refinery experience are discussed

One of the objects of the Institution is to promote the better education of those intending to enter the profession of petroleum technology. With this in view the council has awarded annually since 1924 two scholarships of the value of £40 each. These are tenable at the School of Oil Engineering and Refining of the University of Birmingham and the Royal School of Mines respectively. In London and Birmingham there are student branches, each of which arranges an attractive programme of papers and visits to works and refineries. Two awards are offered by the council to students—the Institution's Medal and prize for a paper of a technical character, and a prize awarded for a paper on a subject of interest to the petroleum industry, not necessarily of a technical character.

In 1924 the Redwood Medal in commemoration of the founder-president of the Institution was instituted for the paper of the greatest merit presented to the Institution during two consecutive sessions. Under these conditions it was awarded on three occasions, *viz.*, to M. Paul de Chambrier, Mr. C. H. McCarthy Jones and Mr. W. H. Fordham. In 1932 in consideration of the international status attained by the Institution it was decided that the Redwood Medal should be conferred on any eminent person, irrespective of nationality or membership of the Institution, for outstanding work in connection with petroleum technology. The Redwood Medal is thus the highest distinction which can be conferred upon any petroleum technologist from his fellows. Under these latter conditions the medal was awarded to Dr. L. Edeleanu in 1932, and to the late Dr. David White, of the United States Geological Survey, in 1934.

The Institution has been fortunate in that its presidential chair has been honoured by men distinguished in both the scientific and industrial spheres of the industry. It is particularly fitting that Sir John Cadman, who was one of the founders of the Institution, is able to undertake the presidency in a year which marks both the Silver Jubilee of His Majesty and the coming of age of the Institution itself.

News from the Allied Industries

Tanning

THE advent of spring has caused a lull in the demand for sole leather and substitutes are much to the fore in the spring and summer footwear. Forestal Land, Timber and Railways Co., Ltd., tanning extract manufacturers, have issued their report which reveals an increased trading profit of £250,000. It was announced that an agreement had been arranged between the various producers of quebracho extract in the Argentine.

China Clay

THE CHINA CLAY SHIPMENTS for March revealed a decided improvement compared with the previous month. The Port of Fowey despatched more clay in March than all the ports combined shipped in February. Although no shipments were made either at Penzance or Looe in March, the other ports were very active, as the following details will show: Fowey, 44,201 tons of china clay, 3,505 tons of china stone, 2,145 tons of ball clay; Par, 10,894 tons of china clay, 60 tons of china stone; Charlestown, 5,088 tons of china clay, 312 tons of china stone; Padstow, 1,136 tons of china clay; Plymouth, 211 tons of china clay; Newham, 81 tons of china clay; By Rail to Destination, 5,431 tons of china clay; making a total of 73,064 tons.

THE CHINA CLAY SHIPMENTS for April were somewhat below those recorded for March, but, notwithstanding, they were considerably better than the corresponding month in 1934. Fowey shipments, however, were fairly active, being responsible for 42,851 tons of china clay, 1,484 tons of china stone and 1,789 tons of bull clay. Par shipping statistics were also well up to the average—in 8,146 tons of china clay and 1,034 tons of china stone. Charlestown 4,732 tons of china clay, 777 tons of china stone; Penzance 348 tons of china clay; Padstow 170 tons of china clay; Plymouth 257 tons of china clay; Newham 51 tons of china clay; whilst 5,260 tons of china clay was sent direct by rail, making a total of 67,699 tons, compared with 73,064 tons in March.

THE WORKS of English Clays, Lovering and Pochin and Co., Ltd., at Mainbow, near Newton Abbot, has just broken its immunity from serious accidents. Mr. E. Hutchings, the Coroner, on Monday, resumed an inquiry into the death of James Walsh, whose death occurred on April 8, about 100 feet from the surface. Walsh was struck by a slight fall of clay and succumbed to shock on the following day. Mr. R. King, Inspector of Mines, was satisfied with the working conditions and a verdict of accidental death was returned.

Bleaching and Dyeing

THE ALLIED ASSOCIATION OF BLEACHERS, DYERS, PRINTERS AND FINISHERS met representatives of the Federation of Dyers' Unions on May 16 to discuss a demand by the federation for an advance of wages. The federation has asked for an advance in the basic wages for adult males to 34s. and for adult females to 21s. A ballot of the five unions comprising the Federation of Dyers' Unions has decided in favour of tendering three months' notice to terminate the existing common agreement as to wages, and, failing a satisfactory arrangement, the Executive Committee of the federation is authorised to give a week's notice of a stoppage. The efforts that were being made to bring about an amalgamation among the unions in the dyeing, bleaching and finishing trades were mentioned by Mr. Clifford Pulman, of Brighouse, who presided at the opening session of the annual conference of the Amalgamated Society of Dyers, Bleachers, Finishers and Kindred Trades, at Blackpool, on May 11. This conference lasted four days.

Continental Chemical Notes

Bulgaria

CALCIUM CARBIDE, in an annual output capacity of 300 tons, is now being manufactured by Stefan Zaneff, at Kurilowo, near Sofia.

Jugoslavia

ACCORDING TO PRESS REPORTS, a trading company with a capital of 500,000 dinar has been formed in Belgrade, under the style of "Star," with the object of producing and marketing chemical and earth pigments (especially ultramarine) for the paper and textile industries.

Switzerland

THE SOCIETY OF CHEMICAL INDUSTRY, of Basle, closed the year with a net profit of 3.33 million francs (3.36 previous) and declared a dividend of 15 per cent. (unchanged) on the 20 million francs share capital. Gross turnover declined by 6 per cent., much dyestuffs business being lost in Eastern Europe, Asia and America.

THE SANDOZ CHEMICAL CONCERN, of Basle, reports a profit of 3.71 million francs in 1934 (3.65 previous) and declares a dividend of 20 per cent. (unchanged). Reference is made in the report to the development of a valuable new electrical insulating material.

France

WORKING UNDER VERY HIGH PRESSURE the direct fixation of nitrogen to bases has been accomplished by J. Besset. The method is illustrated with reference to the synthesis of barium nitrate by high pressure reaction between nitrogen, oxygen and barium oxide. At 500° C. the reaction proceeds very slowly, but on raising the temperature from 800 to 900° C. under a pressure represented by 1,200 kilos oxygen and 2,400 kg. nitrogen, transformation into barium nitrate is completed after two to three hours' heating ("Compt. rend.," February 25).

Roumania

GLUES AND GELATINE will be the chief manufactures of the recently founded Cleiul Company, Bucharest.

Czecho-Slovakia

A WHITE LEAD PLANT will shortly be constructed in Prague, by the "Bohemian Carbonic Acid and Oxygen Company."

Austria

THE MANUFACTURE OF PAINTS, leather preservatives, shoe-creams and allied products has been taken up by Scheiblberger and Kittler, Vienna.

Germany

FISH CAN BE STORED in a carbon dioxide atmosphere without deterioration for 7 days at normal temperature as against 3 days under ordinary conditions ("Kalteindustrie," 1935, 20).

A DAILY OUTPUT OF 5 TONS CELLULOSE ACETATE is expected to be attained at the Sackingen works of Lonzana A.-G. for Acetate Products, the formation of which was announced last autumn. Production will probably commence in August.

SALES OF COMPRESSED GASES continued to increase in 1934 and approached the high points of 1928 and 1929, states the Gesellschaft für Linde's Eismaschinen in its annual report. In the case of dissolved acetylene, a record turnover was achieved.

LIGNIN SEEMS TO BE A PROMISING SOLID FUEL for explosion motors if a regular supply were forthcoming as a by-product from large-scale saccharification and subsequent fermentation of pinewood. About 30 kg. lignin could be isolated during treatment of 100 kg. dry pinewood. Lignin has a low ash content and high thermal value, and 2 kg. are thermally equivalent to 1 kg. crude diesel oil (Chemiker-Zeitung, May 1).

British Chemical and Dyestuffs Traders' Association

Annual Meeting and Trade Luncheon

THE twelfth annual general meeting of the British Chemical and Dyestuffs Traders' Association was held at the Waldorf Hotel, London, on Wednesday afternoon, when Mr. Victor Blagden, who was unable to be present owing to indisposition, was again elected president. The business meeting was as usual preceded by a trade luncheon, presided over by Mr. H. Gilliat, chairman. The principal guests were Mr. W. J. U. Woolcock, of Imperial Chemical Industries, Ltd., Mr. Fielding, of the Overseas Trade Department, and Mr. J. Davidson Pratt, general manager of the A.B.C.M.

Mr. W. J. U. WOOLCOCK proposed the toast of the Association and recalled the years in which he was general manager of the Association of British Chemical Manufacturers, a period in which that Association and the Chemical and Dyestuffs Traders spent most of their time officially disagreeing. With the passing of time, their feelings had mellowed, and, latterly, at the Import Duties Advisory Committee, he had been interested to see how the secretary of the Chemical and Dyestuff Traders' Association persistently entered an appearance in order to find out exactly what kind of applications were being made, in order that he might report whether it was necessary to oppose officially, to have a talk with the applicants or to withdraw from the case. The Association had worthily upheld the work it started out to do, and it could congratulate itself on the fact that for twelve or thirteen years it had given its members first-class service for a very small subscription. He admired the way the work had been done and the manner in which the changes of the times had been faced. The Association was stronger to-day than at any time in its history.

Government Interference Increasing

Mr. A. F. BUTLER, vice-president, responded in the absence of Mr. Victor Blagden and read the speech Mr. Blagden had intended to deliver. Since they met last year, he said, there had not been any reduction of the difficulties of trading to which he then referred. In fact, one might say with justice that they were faced with more complications than ever before. The Chancellor of the Exchequer told them that we had recovered 80 per cent. of our prosperity. How he reconciled that with the direct taxation which he imposed of over 50 per cent. of our incomes he failed to understand. Tariffs were increasing and quotas and restrictions continued to make both the export and import trades on ordinary lines more and more difficult. Hence, they had more government interference everywhere and barter business arranged between different governments, to the detriment of the legitimate trader. This barter business was far more costly to the contracting parties than if the trade were allowed to move through its normal channels.

As regards the Association, the position had been well maintained and many members had benefited by the work which the Association had accomplished during the year, especially in recovering deposits from the Customs, of which members themselves had been unable to obtain repayment, often after months of direct applications. The merchant, although his position had become more and more difficult of late, still played an important part in commerce and he was a necessary link in the chain of industry for, after all, he was the one who took the risk and opened up new avenues of commerce wherever possible. The managing director of one of the largest copper-producing concerns recently remarked that it was highly desirable to get the merchants interested again and that they should be allowed to carry stocks, etc. Only in this way could the market be revived. He was pleased to be able to testify that Imperial Chemical Industries, Ltd., had given a lead in this direction and was supporting the merchants.

He thanked Mr. Gilliat for the services he had rendered as chairman during the past two years. The secretary had also a deal of work to contend with and made some very satisfactory settlements for members.

The CHAIRMAN (Mr. H. Gilliat), in his report to the members on the year's work of the Association, said the services rendered to members continued to give entire satisfaction. There were two sides to the Association's work. One was assisting individual firms, mainly in regard to the various trade restrictions, and the other side was that of voicing the collective opinion of the trade and endeavouring to protect the interests of chemical merchants. With reference to the Key Industries Duties, it was noteworthy that the exemption list for products not made within the Empire had been considerably extended. The re-exemptions for 1935, however, were not published by the Board of Trade until the middle of December, thus shortening the usual period of notice by several weeks. The tendency to delay such announcements until the latest possible time was unsettling to those sections of the trade that happen to be affected. A little confusion arose in regard to oxalic acid. It was found necessary to re-exempt the material at the last minute when it was known that supplies from the home market would not be forthcoming. It seemed incredible that the Board of Trade could have been unaware of the true position and it was felt that the Department rather tended to give more consideration to a firm merely considering manufacturing a "key" chemical than to consumers. In the interests of the trade, it was hoped that substantial evidence of adequate manufacture within the Empire would be required before consideration was given to re-imposing Key Industry Duty on an exempted material.

Key Industries Duties

The Safeguarding of Industries Act, Part I of which imposed the Key Industries Duties, was due to expire in August, 1936, and the Board of Trade had already appointed a committee of inquiry to consider and report on the position that would then arise. Several issues were involved of vital importance to the chemical trade and the matter was engaging the serious attention of the executive council.

Whatever opinion one held as to the usefulness of the Dyestuffs Act, it was obvious that they must contend with licensing restrictions for some time. As was anticipated in his last report, a number of groups of organic intermediate products had been allowed free import. The operation of the Import Duties Act has become a matter of day-to-day concern to all of them, and during the past twelve months they had to contend with numerous alterations that, either directly or indirectly, affected the chemical trade. Cordial relations had been maintained with the Import Duties Advisory Committee and the Association was frequently able to represent the collective views of members.

A subject of much interest to the chemical trade as a whole was the proposed introduction of regulations for the conveyance of dangerous goods by road. The need for such regulations to control certain classes of materials, such as corrosive acids and inflammable liquids, had been apparent for some time. The Home Office had adopted the wise procedure of consulting all interested parties, and the regulations in their original form would undoubtedly come in for much revision. A series of amendments had been submitted to the Home Office and it was understood that revised draft regulations would be issued. In conclusion, the president thanked Mr. Paige for his courteous assistance during the past year.

Election of New Officers

The following officers were elected: President, Mr. Victor Blagden; vice-presidents, Mr. A. F. Butler, Mr. S. J. C. Mason; chairman, Mr. A. E. Reed (London); vice-chairman, Mr. J. F. A. Segner; hon. treasurer, Mr. W. Beckley; hon. auditor, Mr. B. C. Hughes; executive council, Mr. O. F. C. Bromfield, Mr. S. Cox (Taylor Bros. and Cox, Ltd., London), Mr. H. L. Frodsham (James Beadel and Co., Ltd., Liverpool), Mr. H. Gilliat (E. G. Jepson and Co., Leeds), Mr. F. A. Waugh (Tar Residuals, Ltd., London), Mr. C. H. Wilson (Cole and Wilson, Ltd., Huddersfield).

DEPOSITS OF PHOSPHATE covering an area of "tens of thousands of hectares," have, it is stated, been located in the Italian colony of Tripolitania. The quality of the deposits is said to be similar to those existing in Morocco.

Notes and Reports from the Societies

The Royal Society

Specific Heats of Crystals

THE Bakerian Lecture on the anomalous specific heats of crystals, with special reference to the contribution of molecular rotations was delivered by Professor R. H. Fowler, Plummer Professor of Mathematical Physics in the University of Cambridge, before the Royal Society on May 16. The specific heats of crystals were discussed, with particular reference to regions in which the observed specific heat departs widely from the value to be expected. It is necessary to start by specifying the normal theoretical value of the specific heat for a crystal lattice. This normal specific heat has been frequently assumed to be given with sufficient accuracy by Debye's theory, but it is now known that even for the simplest lattices this may not be so, while large departures from Debye's theory may occur.

Debye's theory, even when corrected by Blackman, still leads always to a value of the specific heat which is monotonic, increasing as the temperature increases. A true anomaly is found in all regions in which the specific heat has a maximum or decreases with rising temperature. There are anomalies in which the extra specific heat has a maximum at a certain temperature and dies away continuously on either side. Examples are provided by the paramagnetic salts, such as $Gd_2(SO_4)_3.8H_2O$, at very low temperatures. The extra heat is due to the variety of orientational states of the Gd+++ ions which possess slightly different energies and behave as free systems independent of the other ions of the lattice. Anomalies also occur when the extra specific heat has a discontinuity; after rising steadily to a considerable value at a certain critical temperature it falls abruptly to zero.

The specific heat of several such anomalies can be explained in terms of a more fundamental physical change in the substance: (*a*) ferromagnetics; (*b*) alloys showing order and disorder properties; (*c*) certain substances, such as ammonium salts and halogen hydrides, in which may be expected a rather sudden transition from oscillational to rotational states for the ammonium ion or the hydride molecule. The extra specific heat is due to (*a*) the demagnetisation, (*b*) the disordering of the lattice, (*c*) the decay of the orientational binding forces with increasing rotation. It ends with a sharp discontinuity, because the effects are co-operative ones and the further they proceed the more easily the remaining stages can be overcome. There are also anomalies in which the whole specific heat anomaly has been concentrated into a localised infinity and becomes a latent heat. In general, solid transition points are of this type. The theory of such cases is still rudimentary, but it is possible to draw some tentative conclusions.

Chemical Engineering Group

Fundamental Principles of Drying

SOME fundamental principles of drying were described by Dr. E. A. Fisher in a paper read before the Chemical Engineering Group and the Society of Chemical Industry (Yorkshire Section) at Sheffield, on April 5. The rate of evaporation of water at any instant per unit of surface is proportional to the difference between the vapour pressure of the evaporating water and the pressure of the water vapour in the adjacent atmosphere. The relationship is quite general, and is applicable to all evaporating liquids, although the value of the constant will vary from liquid to liquid. The effect of air velocity is due to an increase in the rate of diffusion of vapour from the drying surface. A film of air exists at the surface of all solid bodies and in still air may be as much as 4 mm. thick. A free wet surface thermally insulated except from the air in contact with it tends to assume a definite minimum temperature of evaporation with a corresponding lower vapour pressure. This fall in temperature is caused by a loss of sensible heat in the form of the so-called latent heat of vaporisation of the water evaporated. Radiation is also a factor of importance in industrial drying. Material subject to radiation from steam pipes, etc., is found to dry faster than when such sources of radiation are absent. Furthermore, radiant heat may be used to speed up the rate of drying and consequently increase the capacity of any given drier.

All wet solids being dried under constant drying conditions exhibit a period during which the rate of drying is constant. The rate does not continue constant until the solid is dry, but at some definite moisture content, which may be called the critical moisture content, the rate of drying begins to decrease and continues decreasing until drying ceases.

A typical rate-of-drying curve consists of four distinct portions, three linear and one curved, separated by three more or less sudden changes of direction. The first portion at the wet end of this curve, the constant-rate portion, is horizontal, while the falling-rate portion has two linear sections. At a low water content the rate curve bends round to the origin, evaporation becoming very slow. It is inferred that along this portion of the curve the hygroscopic water is given off. This portion of the curve does not exist at all with some materials, such as sand and kaolin, and is of no interest in industrial drying when drying is rarely if ever carried to completion. The two linear portions of the falling-rate curve must be determined by some factors connected with the nature of the material drying, the internal factors referred to above which act as limiting factors in rate of drying.

It is possible by varying the drying conditions, even with the same material, to obtain drying curves in which the falling-rate portion may be in two sections, or it may consist solely of the first section, in which rate of surface evaporation is the controlling factor, or of the second section, in which rate of moisture movement within the solid is the controlling factor.

The Drying of Clay by Acid

At the same meeting a paper was read by Mr. H. H. Macey on the promotion of the drying of clay by the coagulating effect of acid. The effect of hydrochloric acid on clay varies enormously from clay to clay. In some cases the acid has the power of preventing cracking to a large degree, in others the effect is very small. The sedimentation test, which can be carried out in a comparatively short time, gives definite indications first whether the clay will respond favourably to the acid in cracking, and secondly the amount of acid required. The action of the acid in preventing cracking is due to the opening up of the water channels in the plastic body. This is confirmed by measurements of the shrinkage of clays with and without acid additions. The amount of acid necessary to prevent cracking in those clays which respond to treatment is not large, and is smaller than the maximum quantity the clay can absorb. The cost of adding the required amount of acid is approximately 3s. per ton of dry clay. In those cases where the acid has a beneficial effect on cracking this is permanent, and there is no tendency for it to be nullified by the firing.

Modern Drying Machinery

Mr. T. J. Horgan described modern drying machinery. The single-shell dryer is the simplest form of rotary dryer; it is not very efficient, and neither is it so economical in power consumption or in upkeep costs as various other types of dryers. It possesses the advantages of simplicity and accessibility, however, and is generally installed in circumstances where these are the main consideration. The rotary louvre dryer differs in several points of construction from the shell dryer. The internal periphery of the cylinder is divided up into a number of horizontal passages tapering slightly from the feed end of dryer to the discharge end. Specially shaped steel plates or louvres cover the inner faces of these passages and form longitudinal slots throughout the entire length of the dryer. The material to be dried is fed into the drum at one end through a chute and rests on the louvre plates. The hot air and products of combustion from a furnace are blown into a stationary head at the feed end by a fan, and thence through the horizontal passages and the longitudinal slots formed by the louvres. The charge rests on the louvres until the angle of repose is exceeded and then rolls over, at the same time moving forward slowly, propelled by the rotation of the cylinder, and the constant pressure of the infeeding material combined with the taper shape of the louvres.

The gas distributing head coincides with the angle of repose of the material, and, as the drum rotates, those gas passages

which lie immediately below the material in the dryer are alternately closed and uncovered, permitting the hot gases to pass into the louvres and through the material undergoing treatment: the gases are finally exhausted through a second opening in the distributor head.

Society of Public Analysts

Elections to Membership

A MEETING of the Society of Public Analysts was held at the Chemical Society's Rooms, Burlington House, London, on May 1, Mr. John Evans, president, being in the chair. Certificates were read in favour of F. H. Milner, L. C. Nickolls, C. P. Stewart and S. L. Tompsett. The following were elected members: William Godden and Frank Morton.

A New Counting Field Finder

A counting-field finder to enable the microscopist to examine a number of fields in selected positions in a microscopical mount without the use of a mechanical stage, was described by Mr. T. E. Wallis. Upon a piece of thin cardboard is drawn a rectangle, 3 × 1 inch, and above and below and to the right and left of this rectangle lines are ruled at distances corresponding with the distances in millimetres of the selected fields from two diameters intersecting at right angles at the centre of the mount. By moving the slide until its edges coincide with each of the lines in turn, one is able to bring the selected fields into view in regular succession. The card has a circular hole, 1 inch in diameter, at the centre, and it can be attached to the plain stage by clips or by an adhesive.

Colour Measurements for Oils

Colour measurement of oils and other liquids was the subject of a joint paper by Mr. E. R. Bolton and Mr. K. A. Williams. Apparatus has been devised whereby the light impinging on a photo-electric cell is freed from infra-red rays by the interposition of a cell containing a solution of copper sulphate. The light from a suitable source is passed through Wratten filters selected to give light of the required wave-length, then through the copper sulphate cell and an empty cell placed in front of the photo-electric cell, and the galvanometer deflection is read. The oil or other liquid is then put into the empty cell and the deflection again read. The percentage light transmitted by the liquid may thus be calculated under standardised conditions. The results are comparable with those given by the best visual methods, although they are obtained in different units.

Measurement of Rancidity

A colorimetric method for the quantitative measurement of rancidity was described by Mr. Magnus A. Pyke. In the most common type of rancidity epihydrinaldehyde is formed, and it is this substance that gives the red colour in the Kreis reaction. A quantitative measurement of rancidity has been based upon the depth of colour developed under standard conditions in the reaction between epihydrinaldehyde, phlorogluinol and sulphuric acid in acetone solution. The depth of colour is measured in Lovibond red units and the corresponding percentage of epihydrinaldehyde can be calculated from a graph.

Oil and Colour Chemists

Mr. A. J. Gibson becomes Hon. Secretary

THE annual general meeting of the Oil and Colour Chemists Association was held at the Institute of Chemistry, on May 9. The president, Mr. G. A. Campbell, was in the chair. The report of the council showed a membership of 547, compared with 468 in the previous year. The finances continued in a satisfactory condition. Reference was made to the formation of the Scottish Section, of which Mr. J. A. Wilson is chairman and Mr. A. H. Whitaker is hon. secretary.

The council has for some years awarded one year's free membership to students recommended by the principals of various colleges where classes are held on paints, pigments, varnish and other allied subjects. A change has been made this year to the extent that free membership will be awarded to students in their last year. Instead of one year's membership, one and a half year's membership will be awarded starting from July 1, 1935, in order to cover a complete session. As before, however, students must be recommended by the principals of the colleges concerned.

Dr. C. F. New was elected hon. auditor for the coming year.

The PRESIDENT, referring to the election of officers, said the council regretted that Mr. Forrest Scott had been compelled to resign the hon. secretaryship which he had held for four or five years, but they had been fortunate in obtaining the consent of Mr. A. J. Gibson to act if elected. Mr. Gibson was a man of enthusiasm and energy and occupied a position well suited to give of his best in the interests of the Association. At the moment they were in the midst of a great movement in the chemical societies, and they were wondering how these moves might affect societies like the Association.

The following elections were then announced. President, G. A. Campbell; vice-presidents, A. P. Bevan, M. E. Dougherty, A. Hancock, D. Wait, J. A. Frome Wilkinson; hon. secretary, A. J. Gibson; hon. treasurer, H. D. Bradford; members of council, F. Sowerbutts, Dr. J. O. Cutter, J. L. King, H. C. F. Randall. Votes of thanks to the retiring members of council concluded the annual general meeting.

Hiding Power of Paints

An ordinary meeting followed and there was an exhibition and demonstration of apparatus. By permission of the Director of Research, the Paint Research Station at Teddington sent "The Transmeter," an instrument for measuring hiding-power by observing the transmission of light through the film of paint; Professor G. I. Finch showed an "Electron Diffraction Camera," which illustrated some aspects of surface structure; "The Tintometer" was exhibited by the Tintometer Co., and Dr. J. J. Fox, of the Government Laboratory, sent a "Penetrometer" fitted with magnetic release, a modification of the hand-operated type of instrument.

The PRESIDENT mentioned that arrangements had been made for a lecture to be given early in June by Dr. W. Krumbhaar in conjunction with the Paint Industries Club and the commercial side of the industry, dealing with his experiences in the trade during recent years.

Society of Chemical Industry

Composition and Properties of Portland Cement

THE relation between the composition and properties of Portland cement was discussed in a paper which Mr. F. M. Lea read before the Road and Building Material Group of the Society of Chemical Industry in London on April 10.

Portland cement is produced by a clinkering process in which some 20 per cent. to 30 per cent. of the mix becomes liquid at the clinkering temperature, and the conception that Portland cement clinker is a material which closely approaches equilibrium at the clinkering temperature, but in which the equilibrium is "frozen" on cooling, has gained much support. In the calculation of compound content it is assumed that all the liquid formed in the cement clinker at the clinkering temperature crystallises on cooling. Microscopic examination of cements suggests, however, that part of this liquid may sometimes fail to crystallise and form a glass, but there is at present little knowledge of the relative properties of glass and crystal phases of the same mean composition. The properties of Portland cement are determined also in varying degrees by other factors, such as fineness of grinding, gypsum content, etc. Thus, the influence of the fineness of cement on the rate of hydration, heat evolution and strength development is large, whilst its effect on chemical resistance is probably small and that on shrinkage more uncertain.

The rate of strength development of a cement tends to increase as the lime content is raised, and it is believed that a high content of alumina and ferric oxide favours the production of cements which show a rapid development of strength. The alumina and ferric oxide in a raw cement mix normally pass entirely into the liquid formed on clinkering, and the compounds C_3A and C_4AF are formed by the crystal-

lisation of this liquid on cooling. No conclusion, however, can be drawn from existing data as to the contribution per unit weight of the compounds C_3A and C_4AF to cement strengths.

When set Portland cement is attacked by alkali or calcium sulphates the free calcium hydroxide present in the set cement is converted to calcium sulphate, and the hydrated aluminate compounds react to form calcium sulphoaluminate. In the case of attack by magnesium sulphate, the action also extends to the hydrated silicate compounds. Considerable differences exist between the resistance to sulphate attack of mortars or concretes made from different Portland cements; this resistance, as measured by an arbitrarily defined life period, may vary by a factor as large as ten.

While the greater part of the available evidence shows that a general correlation exists between sulphate resistance and C_3A content, the individual exceptions to the rule are so numerous that it does not afford a safe index by which the resistance of a cement can be judged. The tests on commercial cements also fail to establish definitely a relation between C_3S content and sulphate resistance. It is evident that other factors are also involved.

Summer Meeting of the Food Group

THE summer meeting of the Food Group will be held at Norwich, Friday and Saturday, May 24 and 25. On Friday afternoon the Carrow Works of J. and J. Colman, Ltd., will be open for inspection. On Saturday afternoon a number of papers on milk as a raw material of the food industry will be read and discussed; these papers include "Requirements for Clean Milk" (Dr. Ruddock-West), "Some Biochemical Aspects of Cheese Ripening" (Dr. J. G. Davis, National Institute for Dairy Research), "Dried Milk in the Baking Industry" (Dr. E. A. Fisher, Flour Millers' Research Association), and "Dried Milk in the Chocolate Industry" (Mr. Lipscomb, of A. J. Caley and Son).

Institute of Metals

Atomic Arrangement in Metals and Alloys

PROFESSOR W. L. BRAGG, F.R.S., delivered the 25th annual May Lecture before the Institute of Metals, in London, on May 8, his subject being the inner structure, or atomic arrangement, of metals and alloys.

X-ray analysis, said Professor Bragg, has given us a new method for examining solid bodies, because by observing the way in which these rays are scattered or "diffracted" by the regular pattern of a crystalline solid, the arrangement of the atoms in the solid can be deduced. The new discoveries about the structure of metals made by X-ray analysis formed the subject of the May Lecture given by his father, Sir William Bragg, to the Institute of Metals in 1916.

The great technical importance of metals and alloys makes any contribution to a knowledge of their fundamental structure a matter of considerable interest. Three main features of structure may be distinguished. There is first the atomic arrangement in single crystal grains of a homogeneous alloy which is in a state of equilibrium. There is in the second place the nature of the arrangement in an alloy which is not in equilibrium, but has been obtained in some other state by the quenching and annealing processes which are so widely used to give the alloy desirable properties, In the third place, there is what may be termed the "geography" of the alloy. By this is meant the shape and size of the crystal grains, their orientation relatively to each other, and the way in which blocks of the various different crystalline phases fit into each other if more than one is present. All these factors are of importance in determining the properties of the alloy, and all can be examined by X-ray methods.

In general, when one metal is alloyed into another a series of phases appear. Metal A dissolves a certain amount of metal B with a gradual alteration in properties as the proportion of B increases. At a certain composition, a limit is reached and for greater amounts of metal B a new phase appears as separate crystals of quite different properties mixed with the first phase. Their relative amount increases till the whole structure consists of the new phase. Regions of single and double phase alternate as the composition varies from pure A to pure B. These phases are the nearest approach in an alloy system to the chemical compounds formed by combining elements.

X-ray analysis has shown that each phase has its own definite pattern, such as a cubical array with atoms at corners and centres, or at corners and centres of faces. The pattern changes from phase to phase. One of the most interesting of recent contributions has been a theory put forward by H. Jones which indicates the factors determining the type of pattern in each phase. The theory is only tentative and approximate, but it gives for the first time a reason for one of the most striking generalisations about alloy patterns to which X-ray analysis has led us. This is the empirical Hume-Rothery rule, which states that the ratio of free electrons to atoms in a structure is the same for alloys with the same pattern. Jones has shown how the alloy pattern affects the binding energy of these free electrons, and so has given a reason for the Hume-Rothery rule.

Another point brought out by the X-ray analysis is that the method of arrangement of the atom amongst the positions of the phase pattern can be varied widely. The phase pattern is an entity apart from the way the atoms are distributed, in marked contrast to ordinary chemical compounds. The study of the movements of the atoms amongst the positions, as affected by heat treatment, can be made the basis of a very interesting theory. At high temperatures the atoms are shuffled up in a random way, at low temperatures they sort themselves out into a regular alternation. The course of the transformation as temperature varies, its rate of attaining equilibrium, its influence on the specific heat and electrical resistance of the alloy, and many other features can be predicted theoretically and agree with experiment. These transformations explain many hitherto puzzling features of alloy phase-diagrams.

The importance of this work is that it provides a basis for the chemistry of compounds formed between metals. Although an immense amount of knowledge about the properties of metals and alloys has been won, it is perhaps fair to say that a fundamental basis of this kind has hitherto been a real need. The determination of the arrangement of atoms in chemical compounds has caused us to view many of the generalisations of chemistry in a new light, and this has been conspicuously the case in metallurgy.

Personal Notes

MR. HAROLD FOLLOWS, for 45 years with Hardman and Holden, Ltd., Miles Platting died on May 8, aged 72.

MR. MATTHEW H. STILES, the oldest chemist in Doncaster, a founder of the Doncaster Scientific Society in 1880, has died at his home in Avenue Road, Doncaster, aged 88. He was a life vice-president of Doncaster Scientific Society.

MR. JOHN ROGERS, a director of Imperial Chemical Industries, Ltd., has been appointed a member of the board set up by the Ministry of Labour to hear the application by the Cotton Spinners' and Manufacturers' Association and the Operative Weavers' Amalgamation for legislation on standard wages in the weaving section of the cotton industry.

MR. FREDERICK J. WEST, chairman and managing director of West's Gas Improvement Co., Ltd., has been awarded the Walton Clark Gold Medal for original and notable work in the gas industry. The medal is awarded annually by the Franklin Institute of the State of Pennsylvania, but no adjudication has been made since 1932.

MR. HERBERT H. THOMAS, D.Sc., F.R.S., petrographer to H.M. Geological Survey, Department of Scientific and Industrial Research, since 1911, collapsed at Waterloo Station, London, on May 12, and died before reaching hospital. Author of many works dealing with petrology and mineralogy, Mr. Thomas was, in 1925, awarded the Murchison medal of the Geological Society. In 1927 he was president of a section of the British Association.

SIR JAMES WALKER, a distinguished Scottish chemist, has died at his residence in Edinburgh, aged 72. For 20 years Sir James was the occupant of the Chair of Chemistry in Edinburgh University and he gave valuable service to the country during the war as a manager of H.M. Factory at Craigleith, where high explosives were manufactured. Despite the strong opposition of the older school of scientists, he won widespread support for the ideas of vant' Hoff and Arrhenius, and a text-book he provided on the subject is in use not only throughout the universities and colleges of this country but also in those of America.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Complete Specifications Open to Public Inspection

3 : 4 : 5 : 6-TETRAHALOGEN-2-AMINO-1-OXYBENZENES, manufacture. I. G. Farbenindustrie. Nov. 2, 1933. 24998/34.

NITROCELLULOSE LACQUERS, manufacture.—Deutsche Celluloid-Fabrik. Nov. 4, 1933. 26786/34.

MAGNESIUM AND ALLOYS thereof, drawing.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken. Oct. 30, 1933. 28578/34.

PERYLENE, manufacture.—W. W. Groves. Nov. 2, 1933. (Cognate application, 30109/34.) 30108/34.

HYDROCARBON DISTILLATES, manufacture.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Nov. 4, 1933. 30666/34.

HYDANTOINS, manufacture.—Soc. of Chemical Industry in Basle. Nov. 1, 1933. (Cognate application, 31103/34.) 31102/34.

ALLOY COMPOSITIONS.—Electro Metallurgical Co. Oct. 31, 1933. 31278/34.

ORGANIC COMPOUNDS, treatment.—British Celanese, Ltd. Oct. 31, 1933. 31279/34.

POLYMERISATION PRODUCTS, manufacture.—Dr. H. Staudinger. Nov. 1, 1933. 31392/34.

TRISAZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Nov. 3, 1933. 31632/34.

OXYNAPTHOTRIAZOLES, manufacture.—I. G. Farbenindustrie. Nov. 3, 1933. 31736/34.

Specifications Accepted with Date of Application

CARBONACEOUS MATERIALS, destructive hydrogenation.—R. Holroyd, C. Cockram, and Imperial Chemical Industries, Ltd. July 29, 1933. (Cognate application, 36686/33.) 427,883.

REFINED ETHERS of polysaccharides and processes of making same.—Dr. L. Lilienfeld. July 17, 1933. 427,386.

CARBOHYDRATE DERIVATIVES and processes for making same.—Dr. L. Lilienfeld. July 17, 1933. 427,387, 427,388.

LIQUID HYDROCARBON FUEL BURNING DEVICES.—L. Mellersh-Jackson. July 18, 1933. 427,465.

CELLULOSE, manufacture.—H. Dreyfus. Sept. 23, 1933. 427,626.

ORGANIC ACIDS from aldehydes and primary alcohols, manufacture.—W. J. Hale. Oct. 18, 1933. 427,631.

ANTHRAQUINONE-2^1 : 1^1 : 1 : 2-ANTHRAQUINONES, manufacture.—I. G. Farbenindustrie. Oct. 20, 1932. 427,327.

DYESTUFFS of the anthraquinone series.—I. G. Farbenindustrie Oct. 21, 1932. 427,332.

1-AZANTHRAQUINONE and its derivatives, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 23, 1933. 427,485.

TITANIUM COMPOUNDS.—Titan Co. Aktieselskabet. Oct. 23, 1933. (Addition to 392,194.) (Convention date not granted.) 427,339.

AQUEOUS FORMALDEHYDE solutions, stabilisation.—E. I. du Pont de Nemours and Co. Oct. 24, 1932. 427,423.

PLASTIC MATERIALS and methods of production thereof.—J. W. C. Crawford, J. McGrath, and Imperial Chemical Industries, Ltd. Oct. 25, 1933. 427,494.

HYDRATED SODIUM METASILICATE, production.—Grasselli Chemical Co. Oct. 25, 1932. (Cognate application, 29633/33.) 427,496, 427,497.

CELLULOSE DERIVATIVES, manufacture and use.—H. Dreyfus. Oct. 26, 1933. 427,559.

ETHYLPROPLACROLEIN, hydrogenation.—Carbide and Carbon Chemicals Corporation, and W. J. Toussaint. May 8, 1934. 427,368.

MAGNESIA AND NITROGENOUS FERTILISERS from dolomite, manufacture and production.—Klöckner-Werke A.-G. Oct. 2, 1933. 427,526.

SODIUM ALUMINATE, manufacture and production.—J. Y. Johnson (Pennsylvania Salt Manufacturing Co.). Nov. 27, 1934. 427,459.

CELLULOSE DERIVATIVE COMPOSITIONS and articles containing or coated with cellulose derivatives.—British Celanese, Ltd., and W. H. Moss. Aug. 24, 1933. (Divided out of 23533/33.) 427,621.

Applications for Patents

(April 25 to May 1 inclusive.)

VARNISH COMPOSITIONS.—Bakelite, Ltd. (United States, June 22, '34.) 12905.

COMPOSITIONS containing synthetic resins.—Bakelite, Ltd. (United States, June 22, 34.) 12906.

SYNTHETIC DESINS, production.—Bakelite, Ltd. (United States June 22, '34.) 12907.

AZO DYESTUFFS, manufacture.—A. G. Bloxam. 12552.

ORGANIC COMPOUNDS.—British Celanese, Ltd. 12651.

MIXED ESTER DERIVATIVES OF GLYCOL.—Carbide and Carbon Chemicals Corporation. (United States, May 8, '34.) 12638.

ACID WOOL DYESTUFFS, manufacture.—A. Carpmael. 12685.

COLOURED MASSES from regenerated cellulose, etc., manufacture. A. Carpmael. 12913.

ADHESIVES, manufacture.—A. Carpmael. 12914.

MOLYBDENUM-ALLOY STEELS.—Climax Molybdenum Co. (United States, Nov. 27, '34.) 12784.

AZINE DYESTUFFS, manufacture.—F. H. S. Curd. 12494.

OXIDES OF SULPHUR, production.—Gas Light and Coke Co. and W. G. Adams. 12450.

SOLUTION OF SODIUM HYPOCHLORIDE, ETC., production.—H. Goldseller and H. Papert. 12881.

SILVER-HALIDE EMULSIONS in colour, development.—W. W. Groves. 12449.

SOLUTIONS OF BISMUTH SILTS, manufacture.—I. G. Farbenindustrie. (Germany, April 27, '34.) 12673.

ARTIFICIAL SILK.—Imperial Chemical Industries, Ltd. 12492.

AZO DYESTUFFS, manufacture.—Imperial Chemical Industries, Ltd., and A. H. Knight. 12493.

AZINE DYESTUFFS, manufacture.—Imperial Chemical Industries, Ltd. 12494.

HALOGEN DERIVATIVES OF RUBBER, manufacture.—Imperial Chemical Industries, Ltd. 12495.

PLASTICISED CELLULOSE ESTER COMPOSITIONS, production.—Imperial Chemical Industries, Ltd. (United States, April 26, '34.) 12608, 12609.

PIGMENTS, manufacture.—Imperial Chemical Industries, Ltd. 13040.

COMPOUNDS OF CHRYSENE-QUINONE SERIES, manufacture.—J. Y. Johnson. 12443.

CARBON DIOXIDE, ETC., from ammonia, separation.—J. Y. Johnson. 13002.

HYDROQUINONES, production.—Kodak, Ltd. (United States, April 25, '34.) 12424.

AZOBENZENE, production.—E. H. and S. W. Reichenberg. 12588.

DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, May 19, '34.) 12871.

ELASTIC ARTICLES from polyvinyl alcohols, production.—H. Vohrer. (Germany, Nov. 19, '34.) 13036.

(May 2 to 8 inclusive.)

RUBBER DERIVATIVES.—J. P. Baxter and Imperial Chemical Industries, Ltd. 13303.

REMOVAL OF HYDROGEN-SULPHIDE from gases.—E. H. Boiling and South Metropolitan Gas Co. 13345.

THIO-BARBITURIC ACID COMPOUNDS, obtaining.—A. F. Burgess (Abbott Laboratories). 13216.

AZO DYESTUFFS on textile fibres, production.—Calico Printers' Association, Ltd., and J. S. Heaton. 13361.

NONDECYL OXYGENATED COMPOUNDS, production.—Carbide and Carbon Chemicals Corporation. (United States, May 9, '34.) 13322.

ALCOHOL SULPHATION PROCESS.—Carbide and Carbon Chemicals Corporation. (United States, May 9, '34.) 13323.

AZO DYESTUFFS, manufacture.—A. Carpmael. 13293.

HIGH-MOLECULAR PRODUCTS, manufacture.—A. Carpmael. 13583.

TRANS-ANDROSTERONE, ETC., manufacture.—A. Carpmael. 13581.

PREGNENDIONE, manufacture.—A. Carpmael, 13582.

POTASSIUM SULPHATE, ETC., manufacture.—A. E. Cashmore, Imperial Chemical Industries, Ltd., and I. L. Clifford. 13487.

RUBBER DERIVATIVES.—R. C. Cooper and Imperial Chemical Industries, Ltd. 13304.

CONDENSATION PRODUCTS, manufacture.—Durand and Huguenin A.-G. (Germany, May 5, '34.) 13435.

REMOVAL OF HYDROGEN SULPHIDE from gases.—Gas Light and Coke Co. and W. K. Hutchison. 13600.

TIN, recovery.—T. Goldschmidt A.-G. (Germany, May 7, '34.) 13467.

ALGINATES, manufacture.—A. H. Gruart. (Belgium, May 5, '34.) 13268.

CHRYSENE MONOSULPHONIC ACID, manufacture.—I. G. Farbenindustrie. (Germany, May 4, '34.) 13125.

BISMUTH SALTS, manufacture.—I. G. Farbenindustrie. (Germany, May 4, '34.) 13263.

VAT DYESTUFFS, manufacture.—I. G. Farbenindustrie. (Germany, May 9, '34.) 13294.

DYESTUFF INTERMEDIATES.—Imperial Chemical Industries, Ltd. 13300.

HALOGEN DERIVATIVES of rubber, manufacture.—Imperial Chemical Industries, Ltd., and J. G. Moore. 13302.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE price of all grades of benzol has been increased by 1d. per gal. owing to the increase in the price of petrol. There are no price changes to report in the markets for general heavy chemicals, rubber chemicals, wood distillation products, pharmaceutical and photographic chemicals, perfumery chemicals, essential oils and intermediates. Unless otherwise stated theprices below cover fair quantities net and naked at sellers' works. From July 1 a new schedule for phenol has been agreed, with prices varying from 6¾d. to 7¼d. per lb. according to quantity.

LONDON.—Prices still remain steady with a fair general demand. There is no change to report in coal tar products from last week, the market remaining steady.

MANCHESTER.—The chemical market at Manchester has pursued a more or less normal course during the past week, and in a number of sections a moderate volume of activity has been reported. So far as forward contract buying is concerned there is not a great deal of speculative interest being shown just now owing to the generally stable conditions of the market, and most buyers are content to renew as old commitments expire. Contract business this week has been on a moderate scale, with orders for fair aggregate quantities for near delivery positions. Values are steady to firm almost throughout the range. In the by-products market pitch is easy, but in the case of a number of the light materials the recent tendency has been firmer in consequence of the jump in petrol prices and somewhat higher values are being indicated. Carbolic acid and creosote oil are both moving in fair quantities.

SCOTLAND.—Business has been extremely quiet in the Scottish heavy chemical market for the past week.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80%, £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—11¾d. per lb. less 5%. MANCHESTER: 11¾d.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £40 to £45 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works. full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £54 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 0¾d. per lb.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE. SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £34 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6¾d. to 1s. 3d. per lb.; crimson, 1s. 5½d. to 1s. 7½d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £23, ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton. SCOTLAND: £10 10s.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—3s. 4d. to 3s. 8d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¼d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb.; liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £4 2s. less 2½%.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £25 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34; brown, £32.

LEAD NITRATE.—£27 10s. per ton.

LEAD, RED.—SCOTLAND: £24 to £26 per ton less 2½%; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £36 10s.

LITHOPONE.—30%, £7 to £17 10s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—7¾d. to 8¼d. per lb. for delivery up to December 31.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38 to £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5% d/d U.K. Discount according to quantity. Ground, 5½d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¼/100%, powder, £37. MANCHESTER: £39.

POTASSIUM CHROMATE.—6¼d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

POTASSIUM NIRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 10½d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: B.P., 11½d.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 8¼d. to 8¾d. per lb. SCOTLAND: Yellow spot, 8¼d. ex store. MANCHESTER: Yellow, 8¼d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r in bags.

SODA, CAUSTIC.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £22. SCOTLAND: £20.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lot less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. basis. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 10s. per ton.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £14 10s.

SODIUM META SILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 5½d.

SULPHUR.—£9 15s. to £10 per ton. SCOTLAND: £8 to £9.

SODIUM SILICATE.—140° Tw. Spot £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 2s. 6d.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £141 5s. per ton f.o.b.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 4s. 5d. to 4s. 7d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—11d. to 1s. per lb.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb., 100% d/d buyer's works.

BENZIDINE HCL.—2s. 5d. per lb.

p-CRESOL 34-5° C.—2s. per lb. in ton lots.

m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 01½d.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.

o-NITRANILINE.—3ss. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb., d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb.: 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—9½d. to 11d. per lb.

p-TOLUIDINE.—1s. 11d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £9. Grey, £12 to £14. Liquor, brown, 30° Tw., 8d. per gal. MANCHESTER: Brown, £11; grey, £13 10s.

ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.

CHARCOAL.—£5 to £10 per ton.

WOOD CREOSOTE.—Unrefined, 3d. to 1s. 6d. per gal.

WOOD NAPHTHA, MISCIBLE.—2s. 6d. to 3s. 6d. per gal.; solvent, 3s. 3d. to 4s. 3d. per gal.

WOOD TAR.—£2 to £4 per ton.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 7¾d. to 8¼d. per lb.; crude, 60's, 1s. 1¼d. to 2s. 2¼d. per gal. MANCHESTER: Crystals, 8d. per lb.; crude, 2s. 1d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.

BENZOL.—At works, crude, 9½d to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 3¼d. SCOTLAND: Motor, 1s. 6¼d.

CREOSOTE.—B.S.I. Specification standard, 5¼d. to 5¾d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4¼d. f.o.r. North; 5d. London. MANCHESTER: 5d. to 5¾d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4¼d.; heavy, 4¼d. to 4½d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 6d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4½d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3¼d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Purified crystals, £10 per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PITCH.—Medium soft, 40s. per ton. LONDON: 45s. per ton, f.o.b. East Coast port. MANCHESTER: 35s. f.o.b. East Coast.

PYRIDINE.—90/140, 6s. to 8s. 6d. per gal.; 90/180, 2s. 3d.

TOLUOL.—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 2d.

XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 1d. to 2s. 2d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—£7 5s. per ton; for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.

CYANAMIDE.—£7 5s. per ton delivered in 4-ton lots to farmer's nearest station.

NITRATE OF SODA.—£7 12s. 6d. per ton for delivery to June, 1935, in 6-ton lots, carriage paid to farmer's nearest station for material basis 15.5% or 16% nitrogen.

NITRO-CHALK.—£7 5s. per ton to June, 1935, in 6-ton lots carriage paid for material basis 15.5% nitrogen.

CONCENTRATED COMPLETE FERTILISERS.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents, for delivery up to June, 1935, in 6-ton lots carriage paid.

NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton.

Latest Oil Prices

LONDON, May 15.—LINSEED OIL was firmer. Spot, £23 per ton (small quantities); May, £20 12s. 6d.; June-Aug., £21 2s. 6d.; Sept.-Dec., £21 12s. 6d., naked. SOYA BEAN OIL was quiet. Oriental (bulk), May-June shipment, £21 10s. per ton. RAPE OIL was steady. Crude, extracted, £32 10s. per ton; technical refined, £34, naked, ex wharf. COTTON OIL was steady. Egyptian crude, £24 10s. per ton; refined common edible, £28, and deodorised, £30, naked, ex mill (small lots £1 10s. extra). TURPENTINE was quiet. American, spot, 59s. 9d. per cwt.; June 46s. 3d.

HULL.—LINSEED OIL.—Spot quoted £21 12s. 6d. per ton; May, £21 2s. 6d.; June-Aug., £21 7s. 6d.; and Sept.-Dec., £21 12s. 6d. COTTON OIL.—Egyptian, crude, spot, £25 per ton; edible, refined, spot, £27 10s.; technical, spot, £27 10s.; deodorised, £29 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £21 10s. per ton, naked. GROUNDNUT OIL.—Extracted, spot, £33 10s. per ton; deodorised, £36 10s. RAPE OIL.—Extracted, spot, £31 10s. per ton; refined, £33. SOYA OIL.—Extracted, spot, £26 10s. per ton; deodorised, £29 10s. COD OIL.—F.o.r. or f.a.s., 25s. per cwt. in barrels. CASTOR OIL.—Pharmaceutical, 41s. per cwt.; first, 36s.; second, 33s. TURPENTINE.—American, spot, 61s. 9d. per cwt.

Forthcoming Events

May 24 and **25.**—Society of Chemical Industry (Food Group). Summer Meeting. "Milk as a Raw Material of the Food Industry." Dr. Ruddock-West—"Requirements for Clean Milk." Dr. J. G. Davis—"Some Biochemical Aspects of Cheese Ripening." Dr. E. A. Fisher—"Dried Milk in the Baking Industry." Mr. Lipscomb—"Dried Milk in the Chocolate Industry." Carrow Works, J. and J. Colman, Ltd., Norwich.

Chemical and Allied Stocks and Shares

Current Quotations

THE following table shows this week's Stock Exchange quotations of chemical and allied stocks and shares compared with those of last week. Except where otherwise shown the shares are of £1 denomination.

Name.	May 14.	May 7.
Anglo-Persian Oil Co., Ltd. Ord.	54/4½	54/4½
,, 8% Cum. Pref.	36/3	35/6
,, 9% Cum. Pref.	38/-	37/6
Associated Dyers and Cleaners, Ltd. Ord.	2/2½	2/2½
,, 6½% Cum. Pref.	4/8½	3/4½
Associated Portland Cement Manufacturers, Ltd. Ord.	50/-	50/-
,, 5½% Cum. Pref.	27/9	27/9
Benzol & By-Products, Ltd. 6% Cum. Part. Pref.	2/6	1/4½
Berger (Lewis) & Sons, Ltd. Ord.	61/3	62/6
Bleachers' Association, Ltd. Ord.	5/-	5/-
,, 5½% Cum. Pref.	6/10½	6/10½
Boake, A., Roberts & Co., Ltd. 5% Pref. (Cum.)	21/3	21/3
Boots Pure Drug Co., Ltd. Ord. (5/-)	48/-	48/6
Borax Consolidated, Ltd. Pfd. Ord. (£5)	96/3	96/3
,, Defd. Ord.	15/-	14/9
,, 5½% Cum. Pref. (£10)	220/-	210/-
,, 4½% Deb. (1st Mort.) Red. (£100)	£109	£108
,, 4½% 2nd Mort. Deb. Red. (£100)	£102	£102
Bradford Dyers' Association, Ltd. Ord.	7/6	6/10½
,, 5% Cum. Pref.	8/9	8/9
,, 4% 1st Mort. Perp. Deb. (£100)	£82	£82
British Celanese, Ltd. 7% 1st Cum. Pref.	26/6	26/-
,, 7½% Part. 2nd Cum. Pref.	18/6	17/3
British Cotton & Wool Dyers' Association Ltd. Ord. (5/-)	5/3	5/-
,, 4% 1st Mort. Deb. Red. (£100)	£90	£90
British Cyanides Co., Ltd. Ord. (2/-)	3/-	3/-
British Drug Houses, Ltd. Ord.	18/9	18/9
,, 5% Cum. Pref.	22/6	22/6
British Glues and Chemicals, Ltd. Ord. (4/-)	3/6	3/6
,, 8% Pref. (Cum. and Part.)	26/10½	26/10½
British Oil and Cake Mills, Ltd. Cum. Pfd. Ord.	45/7½	45/7½
,, 5½% Cum. Pref.	26/3	26/3
,, 4½% First Mort. Deb. Red. (£100)	£108/10/-	£108/10/-
British Oxygen Co., Ltd. Ord.	88/9	85/-
,, 6½% Cum. Pref.	31/10½	31/10½
British Portland Cement Manufacturers, Ltd. Ord.	85/-	85/-
,, 6% Cum. Pref.	29/-	29/-
Bryant & May, Ltd. Pref.	67/6	67/6
Burt, Boulton & Haywood, Ltd. Ord.	19/4½	19/4½
,, 7% Cum. Pref.	27/6	27/6
,, 6% 1st Mort. Deb. Red. (£100)	£105/10/-	£105/10/-
Bush, W. J., & Co., Ltd. 5% Cum. Pref. (£5)	105/-	105/-
,, 4% 1st Mort. Deb. Red. (£100)	£96/10/-	£96/10/-
Calico Printers' Association, Ltd. Ord.	8/9	8/9
,, 5% Pref. (Cum.)	15/7½	15/-
Cellulose Acetate Silk Co., Ltd. Ord.	15/7½	11/10½
,, Deferred (1/-)	3/4½	2/7½
Consett Iron Co., Ltd. Ord.	7/3	5/6
,, 8% Pref.	18/9	18/9
,, 6% First Deb. stock, Red. (£100)	£97/10/-	£97/10/-
Cooper, McDougall & Robertson, Ltd. Ord.	32/6	32/6
,, 7% Cum. Pref.	29/-	28/6
Courtaulds, Ltd. Ord.	52/9	52/1½
,, 5% Cum.	26/3	26/3
Crosfield, Joseph, & Sons, Ltd. 5% Cum. Pre-Pref.	25/-	22/6
,, Cum. 6% Pref.	28/9	28/9
,, 6½% Cum. Pref.	28/9	28/9
,, 7½% "A" Cum. Pref.	30/7½	30/7½
Distillers Co., Ltd. Ord.	91/6	91/6
,, 6% Pref. Stock, Cum.	32/-	31/6
Dorman Long & Co., Ltd. Ord.	11/3	11/3
,, Prefd. Ord.	11/3	—
,, 6½% Non-Cum. 1st Pref.	19/-	—
,, 8% Non-Cum. 2nd Pref.	13/-	—
,, 4% First Mort. Perp. Deb. (£100)	£102/10/-	—
,, 5% 1st Mort. Red. Deb. (£100)	£103	—
English Velvet & Cord Dyers' Association, Ltd. Ord.	4/4½	1/10½
,, 5% Cum. Pref.	7/6	10/-
,, 4% First Mort. Deb. Red. (£100)	£70	£70
Fison, Packard & Prentice, Ltd. Ord.	38/9	38/9
,, 7% Non-Cum. Pref.	30/-	30/-
,, 4½% Debs. (Reg.) Red. (£100)	£107	£107
Gas Light & Coke Co. Ord.	27/9	27/6
,, 3½% Maximum Stock (£100)	£87/10/-	£87/10/-
,, 4% Consolidated Pref. Stock (£100)	£106/10/-	£106/10/-
,, 3% Consolidated Deb. Stock, Irred. (£100)	£90/10/-	£90/10/-
,, 5% Deb. Stock, Red. (£100)	£117/10/-	£117/10/-
,, 4½% Red. Deb. Stock (1960-65) (£100)	£113/10/-	£113/10/-
Goodlass Wall & Lead Industries, Ltd. Ord. (10/-)	12/6	12/6
,, 7% Prefd. Ord. (10/-)	13/1½	13/1½
,, 7% Cum. Pref.	27/6	27/6
Gossage, William, & Sons, Ltd. 5% 1st Cum. Pref.	24/4½	24/4½
,, 6½% Cum. Pref.	28/1½	28/1½
Imperial Chemical Industries, Ltd. Ord.	35/-	35/-
,, Deferred (10/-)	8/6	8/6
,, 7% Cum. Pref.	34/-	34/-
Imperial Smelting Corporation, Ltd. Ord.	12/6	12/-
,, 6½% Pref. (Cum.)	22/6	22/6
International Nickel Co. of Canada, Ltd. Com.	$29½	$28⅝
Johnson, Matthey & Co., Ltd. 5% Cum. Pref. (£5)	95/-	95/-
,, 4% Mort. Deb. Red. (£100)	£98/10/-	£98/10/-
Laporte, B., Ltd. Ord.	117/6	117/6
Lawes Chemical Manure Co., Ltd. Ord. (10/-)	8/7½	5/7½
,, 7% Non-Cum. Part. Pref. (10/-)	10/-	7/6
Lever Bros., Ltd. 7% Cum. Pref.	32/9	32/6
,, 8% Cum. "A" Pref.	33/6	33/3
,, 20% Cum. Prefd. Ord.	78/1½	77/6
,, 5% Cons. Deb. (£100)	£108	£107/10/-
,, 4% Cons. Deb. (£100)	£105	£104/10/-
Magadi Soda Co., Ltd. 12½% Pref. Ord. (5/-)	1/3	1/3
,, 6% 2nd Pref. (5/-)	6d.	6d.
,, 6% 1st. Debs. (Reg.)	58/-	63/-
Major & Co., Ltd. Ord. (5/-)	7½d.	2/-
,, 8% Part. Prefd. Ord. (10/-)	9d.	2/1½
,, 7½% Cum. Pref.	1/6¾	1/6¾
Mond Nickel Co., Ltd. 5½% Mort. Deb. Red. (£100)	£103	£103
Pinchin, Johnson & Co., Ltd. Ord. (10/-)	43/-	43/-
,, First Prfce. (6½% Cum.)	33/1½	33/1½
Potash Syndicate of Germany (Deutsches Kalisyndikat G.m.b.H.) 7% Gld. Ln. Sr. "A" and "B" Rd.	64/6	64/-
Reckitt & Sons, Ltd. Ord.	113/1½	111/3
,, 4½% Cum. 1st Pref.	25/-	25/-
Salt Union, Ltd. Ord.	36/10½	36/10½
,, Pref.	44/4½	44/4½
,, 4½ Deb. (£100)	£111/10/-	£109
South Metropolitan Gas Co. Ord. (£100)	£132/10/-	£133/10/-
,, 6% Irred. Pref. (£100)	£149/10/-	£149/10/-
,, 4% Pref. (Irred). (£100)	£106/10/-	£106/10/-
,, Perpetual 3% Deb. (£100)	£89/10/-	£89/10/-
,, 5% Red. Deb. 1950-60 (£100)	£115/10/-	£115/10/-
Staveley Coal & Iron Co., Ltd. Ord.	42/6	40/-
Stevenson & Howell, Ltd., 6½% Cum. Pref.	26/3	26/3
Triplex Safety Glass Co., Ltd. Ord. (10/-)	68/1½	68/9
Unilever, Ltd. Ord.	28/9	28/9
,, 7% Cum. Pref.	29/9	29/9
United Glass Bottle Manufacturers, Ltd. Ord.	39/4½	40/-
,, 7½% Cum. Pref.	33/-	33/-
United Molasses Co., Ltd. Ord (6/8)	20/-	18/9
,, 6% Cum. Pref.	25/-	25/-
United Premier Oil & Cake Co., Ltd. Ord. (5/-)	4/9	4/9
,, 7% Cum. Pref.	22/6	25/-
,, 6% Deb. Red. (£100)	£102	£102

From Week to Week

HOWARDS AND SONS, LTD., of Ilford, have contributed one hundred guineas to the King George's Jubilee Trust.

THE SUSPENSION OF IMPORT RESTRICTIONS on artificial oxides of iron, powdered, except iron oxides which have been alkalised for the purification of gas is announced in the French "Journal Officiel" of May 2.

A PERCOLATING BIOLOGICAL FILTER showing the prevention of ponding by insect life is among the exhibits on the Sewage Purification Department stall at the Glasgow Century of Progress Exhibition.

THE NEW BOWLING GREENS of Shawfield Works Welfare Club, connected with John and James White, Ltd., chemical manufacturers, Rutherglen, were opened by Mr. John Ritchie, managing director, on May 11.

BY EXTRAORDINARY RESOLUTION, dated April 29, the nominal capital of the Corn Products Co., Ltd., was increased by the addition of £500,000 beyond the registered capital of £750,000. The additional capital is divided into 500,000 ordinary shares of £1 each.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for an increase in the import duties on linseed oil. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than June 6.

"TRADESMAN'S ENTRANCE" is the title of Mr. John Benn's latest book to be published by Philip Allan on May 23. The author discusses the question whether business offers as satisfying a career to the educated man as a profession. One of the most provocative chapters deals with "Making Money," while commercial training is another controversial subject discussed by the author.

THE BRITISH ASSOCIATION for the Advancement of Science, which in recent years has taken various steps to attract the younger scientific workers to its annual meetings, has recently introduced a statute enabling British corporate bodies (firms, institutions, etc.) to take up corporation membership, which, on payment of a composition fee, will enable them to send a representative or representatives to the meetings in perpetuity. The forthcoming meeting will be held in Norwich, September 4-11.

ABOUT 20 PEOPLE WERE INJURED in a double explosion at the C.W.S. African Oil Mills, Parliament Street, Liverpool, on May 10. A rush of highly-charged air and flame up an elevator which extends from top to bottom of a six-floor building, found an outlet on the fifth floor, where several windows were blown out. Extensive damage was done to the elevator. On the fifth floor several men, trucking and stowing meal, were flung in all directions by the force of the explosion and enveloped in flames; some of them received severe burns to their hands and faces.

THE HULL CHEMICAL AND ENGINEERING SOCIETY and the Yorkshire Section of the Society of Chemical Industry, will pay a joint visit to the works of British Industrial Solvents, Ltd., Saltend, Hull, on June 1. The works contains an extensive modern plant for carrying out catalytic syntheses of organic solvents. Alcohol is converted into acetone, aldehyde, butyl alcohol and a variety of other products in smaller quantities. A self-contained power plant is included. The processes are therefore of considerable interest to the chemist and chemical engineer.

THE THAMES HOUSE Squash Rackets Club offered a new amenity to its members on May 9 when the new swimming bath adjoining the club was opened. The bath has a length of 60 ft. and a width of 21 ft., while the depth varies from 3 ft. 8 in. to 8 ft. 9 in. The water, which is normally kept at a temperature of 77° F., but which can be altered to suit members' requirements, is changed every four hours. A filtration and sterilisation plant, installed by Richard Crittall and Co., Ltd., is used to purify the water. The bath can enjoy the effect of sunlight during the day; inset lighting is used at night. There are two diving boards and a water-chute.

THE BRITISH STANDARDS INSTITUTION has received requests from the Research Association of British Rubber Manufacturers and the Ministry of Health to consider the desirability of steps being taken to co-ordinate methods of testing rubber and rubber products generally, particularly throughout existing British Standard Specifications for rubber products, and the preparation of a British Standard Specification for rubber rings for joints in pipes. In accordance with the usual practice of the Institution, the appropriate industry committee, in this case the Chemical Engineering Industry Committee, authorised the holding of a conference of all interests concerned to ascertain whether there is a consensus of opinion favourable to the work being undertaken and that it is to fulfil a generally-recognised want. The conference will be held on June 19, and, should it be in favour of the work proceeding, a committee will be formed. Should, however, the conference not be in favour, no further action will be taken. Further information can be obtained on application to the Director of the B.S.I., 28 Victoria Street, S.W.1.

THE HABER MEMORIAL LECTURE, arranged by the Chemical Society for May 23, has been unavoidably postponed.

SIMON-CARVES, LTD., Cheadle Heath, near Stockport, have secured a £500,000 contract to supply a complete by-product coking plant to the Tata Iron and Steel Co., Ltd., the largest concern of its kind in India.

AT THE ANNUAL MEETING of the Staffordshire Iron and Steel Institute at Dudley, Mr. T. T. Wright was elected president; Mr. T. G. Banford, senior vice-president; Mr. D. Spittal, junior vice-president; and Mr. E. C. Rollason, secretary.

ERGOMETRINE, the recently-discovered quickly-acting water-soluble alkaloid of ergot, is now manufactured in the laboratories of the British Drug Houses, Ltd., and is available for medicinal use.

EDWARD LESTER HOLLAND, of Wolverhampton, was found lying dead in the Bilston Gas Co.'s laboratory on May 8. He was employed by a Manchester firm who had an oil depot at the gas company's works.

THE BRITISH OXYGEN CO., LTD., held its forty-ninth annual general meeting at the Grosvenor Hotel, Westminster, on May 10. Dr. J. Donald Pollock, the chairman, presided. He stated that during 1934 the uses of the two principal productions of the company—oxypen and dissolved acetylene—had been further extended.

THE DUKE AND DUCHESS OF YORK will visit the Universal and International Exhibition at Brussels, at which the British chemical industry is exhibiting under the auspices of the Association of British Chemical Manufacturers, during "British Week," which will be held there from June 26 to July 2. They will travel to Brussels on July 1 and will visit the exhibition on that and the following day.

THE BOARD OF TRADE returns for the month ended April 30 show that the month's exports of chemicals, drugs, dyes and colours were valued at £1,635,191, against £1,577,695 for April, 1934, an increase of £57,546. Imports for the same period were valued at £936,577, against £866,802, an increase of £69,775, while re-exports amounted to £46,718, against £353,570, a decrease of £306,852.

THE POLISH AGENTS' ASSOCIATION is organising a party of between 30 and 40 agents to visit the British Industries Fair, Birmingham. The party, which will be led by Monsieur Maksymiljan Friede, chairman of the Association, will arrive in London, on Monday and will proceed direct to Castle Bromwich. They will return to London on the same day and will take part in discussions on May 21 and 22 at the Department of Overseas Trade, the Federation of British Industries and the London Chamber of Commerce.

A NEW INDUSTRY may be set up in the Shetland Islands. Two representatives of a Norwegian firm which last year purchased the herring offal from Lerwick's 50 curing stations and ran it to Bergen to be manufactured into oil, have purchased the guano factory at Heogan, Island of Bressay, and a similar factory at Fraserburgh, where they have also acquired a large coal hulk lying in the harbour. The Norwegians buy offal, transfer it to the coal hulk, and dispatch it to Bergen, but they may instal new machinery in the Heogan factory and convert the offal into commercial products there.

IMPERIAL CHEMICAL INDUSTRIES, LTD., have announced the final result of voting at meetings on May 1 regarding the capital reorganisation scheme as follows:—Extraordinary general meeting: For, votes 22,803,402 (91.44 per cent.); against, votes 2,135,971 (8.56 per cent.). Class meetings: Ordinary shareholders, Article 66 applying, for 18,383,874 (94.31 per cent.), against 1,109,217 (4.69 per cent.). Article 66 not applying, for 18,663,383 (94.26 per cent.); against 1,136,162 (5.74 per cent.). Deferred shareholders: Article 66 applying, for 3,632,135 (78.03 per cent.), against 1,022,863 (21.97 per cent.). Article 66 not applying, for 3,722,414 (77.26 per cent.), against 1,095,688 (22.74 per cent.).

THE INSTITUTION OF GAS ENGINEERS will hold its 72nd annual meeting at the Institution of Civil Engineers from June 4 to 7, under the presidency of Mr. C. Valon Bennett. In addition to the presidential address the following papers will be presented: "National Policies Governing the Testing of Gas Appliances," by Mr. Stephen Lacey and Mr. C. A. Masterman (Gas Light and Coke Co.); "Problems and Answers in the Reconstruction of Manufacturing and Distribution Plant, Nottingham," by Mr. G. Dixon; "The Gas Account," by Mr. W. B. McLusky (Halifax); "The Tactical Use of Carburetted Water Gas as a Coal Gas Auxiliary," by Mr. A. G. Glasgow; "Waste Heat Recovery from Retort Settings," by Major W. Gregson; and "The Preparation, Marketing and Utilisation of Coke," by Mr. W. L. Boon. The social events will include a reception and dance at the Park Lane Hotel, and a Kent tour. Visits will be paid to the Rochester works of the Rochester, Chatham and Gillingham Gas Co., the Battersea Power Station of the London Power Co., and the Wandsworth works of the Wandsworth Gas Co.

Company News

International Nickel Co. of Canada.—A dividend of 15 cents per share is announced on the common stock of the company for the quarter to June 30 next.

B. Laporte, Ltd.—A final dividend of 15 per cent. is announced on the ordinary shares, making a total of 20 per cent. for the year to March 31 last. For the previous year a total dividend of 15 per cent. was paid, together with a capital bonus of one new ordinary share for every five held.

Tomaszow Artificial Silk Co.—The profits for 1934, it is reported, rose from £68,654 to £185,543, after providing for depreciation. A sum of £17,591 is placed to statutory reserve, and the dividend is raised from 4 per cent. to 7 per cent. An amount of £3,011 remains, after providing for bonuses and tax, which is to be devoted to welfare work.

North British Rubber Co.—The report for the year 1934 shows a trading profit of £43,515, against £60,914 in the previous year. To this is added £23,029 brought in, making £66,544, less debenture interest, £18,511; fees, £1,951; £19,860 depreciation, and £18,000 in writing off investment in a subsidiary company, leaving £8,222 to be carried forward.

Wall Paper Manufacturers.—The directors have decided to pay an interim dividend of 5 per cent. on the ordinary and deferred stocks in respect of the current financial year, the same as a year ago. Final dividends of 5 per cent. and 7½ per cent. respectively were paid for 1933-34, making 10 per cent. on the ordinary and 12½ per cent. on the deferred shares.

Montecatini (Societa Generale per l'Industria Mineraria and Agricola).—The net profit for 1934 amounted to 66,966,547 lire, against 65,672,031 lire in the previous year. To ordinary reserve is placed 3,348,327 lire; the dividend is 8 per cent.; to directors 672,364 lire, leaving 14,945,855 lire, plus 7,798,176 lire brought in, making 22,744,032 lire, out of which is allotted for completion, within the limit prescribed by law, of ordinary reserve 16,651,672 lire, leaving a final balance of 6,092,359 lire.

Rubber Regenerating Co.—The directors have issued an interim statement in which they state that an interim dividend of 2½ per cent. actual is being paid. At March 31 last the position as regards assets and current liabilities was as follows: Cash, £13,877; debtors, etc., less reserve, £21,012; stocks at cost or market value, £18,253; together, £53,142; less creditors, income-tax reserve, etc., £5,266; leaving surplus of current assets over current liabilities, £47,876; these resources will, it is stated, suffice to carry out the present development programme.

British Cotton and Wool Dyers' Association, Ltd.—The trading profits for the past year amounted to £116,939. After charging debenture interest, etc., and transferring £25,000 to depreciation, the net profits amount to £60,723, compared with £59,945 in the year to March 31, 1934. The available balance is £105,578, compared with £95,664 last year. The ordinary dividend is repeated at 5 per cent. for the year, £16,858 is carried to the obsolescence fund, and £2,693 to the depreciation fund, leaving £47,318 to be carried forward, against £46,956 last year.

Nitrate Railways Co.—The gross receipts for 1934 rose from £151,541 to £264,889, and the net receipts were £58,241, against £25,832. The total amount available, including interest, etc., and £108,198 brought forward, is £200,818, compared with £155,446. The directors have decided not to recommend a dividend for 1934 owing to losses on exchange and the uncertainty of the position in view of the Iquique to La Noria Concession terminating in July, 1936. A total of £56,330 has been charged in respect of exchange differences, leaving £144,487 to be carried forward.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

South Africa.—The Imperial Trade Correspondent at Port Elizabeth reports that the City of Port Elizabeth is calling for tenders, to be presented in Port Elizabeth by August 22, 1935, for the supply, delivery and erection of a 5,000,000-gallon-per-day purification plant at a site adjacent to the Linton Reservoir, Port Elizabeth. (Ref. G.Y. 15140.)

Belgium.—An agent established at Brussels wishes to obtain the representation, on a commission, plus travelling expenses, basis, of United Kingdom manufacturers of grinding machinery for dry colours and seeds; mining machinery and equipment. (Ref. No. 436.)

Belgium.—An agent established at Liège wishes to obtain the exclusive representation, on a commission basis, of United Kingdom manufacturers of special steels, machinery for iron and steel foundries, coal mines, glassworks and cement factories, special greases. (Ref. 437.)

Holland.—An agent established at Amsterdam wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of industrial chemicals, colours and pharmaceutical products. (Ref. No. 438.)

Books Received

Directory of Paper Makers of Great Britain and Ireland, for 1935. London: Marchant Singer and Co. Pp. 300. 5s. 6d.

Thorpe's Dictionary of Applied Chemistry. Supplement Vol. 2 N to Z. By J. F. Thorpe and M. A. Whiteley. London: Longmans, Green and Co. Pp. 728. 60s.

Official Publications

Imperial Institute. Annual Report, 1934. London: John Murray. Pp. 54. 2s.